

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
OAKLAND DIVISION

EPIC GAMES, INC.,

Plaintiff, Counter-defendant,

vs.

APPLE INC.,

Defendant, Counterclaimant.

No. 4:20-CV-05640-YGR-TSH

**WRITTEN DIRECT TESTIMONY OF
LORIN M. HITT, PH.D.**

Trial Date: May 3, 2021

Time: 8:00 a.m.

Courtroom: 1, 4th Floor

Judge: Hon. Yvonne Gonzalez Rogers

Ex. Expert 6

April 23, 2021

AD DEFENDANT A	United States District Court Northern District of California
Case No.	4:20-cv-05640-YGR
Case Title	<i>Epic Games, Inc. v. Apple, Inc.</i>
Exhibit No.	EXPERT 6
Date Entered	_____
By:	Susan Y. Soong, Clerk _____ Deputy Clerk

I. Summary of opinions

1. My analysis in this matter focused on assessing the economic evidence related to the questions of market definition, Apple's alleged market power or monopoly power, and the competitive effects of the challenged conduct. Based on my extensive analysis of available data, documents, and testimony, I have reached the following opinions:

Market Definition

2. **Opinion 1.** My opinion is that the relevant antitrust market to assess the impact of Apple's policies, pricing, and innovations is the market for digital game transactions. Because the App Store operates in a two-sided transaction market, we need to consider substitution possibilities on both sides of the market. From the perspectives of both developers and consumers, the App Store is a substitute for, and competes with, other digital game transaction platforms. (§III, p. 6)

3. **Opinion 2.** This overarching conclusion is strongly supported by quantitative and qualitative evidence showing that developers of many games make digital game transactions across a wide variety of platforms (on mobile devices, PCs, Macs, laptops, tablets, consoles and other devices). Developers can substitute between game transaction platforms for transactions with users, including iOS users. (§§III.A-III.D, pp. 6-16)

4. **Opinion 3.** With respect to the other side of the platform, my empirical analyses also demonstrate that consumers easily substitute across game transaction platforms. That is, consumers can and do make digital game transactions—including Fortnite transactions—across different devices through several game transaction platforms available on those devices. Consumers own or have access to multiple devices on which they can make game transactions, and consumers can and do substitute game transactions through the App Store with transactions through platforms on other devices. To provide just one example, empirical evidence shows that in response to Fortnite's removal from the App Store, many Fortnite consumers switched their purchases from iOS to other transaction platforms. (§§III.E-III.I, pp. 16-37)

5. **Opinion 4.** Additional qualitative evidence that I have reviewed confirms that multiple digital game transaction platforms are alternatives to transacting on the App Store and are substitute products. Internal documents and public statements demonstrate that industry participants, including Apple, operators of other game transaction platforms, and Epic itself, consider other game transaction platforms as competitors to the App Store for digital game transactions. Policies imposed on developers by Nintendo, Sony, and Microsoft aimed at limiting competition from alternative transaction platforms further underscore the reality of competition in the relevant market. (§III.J, pp. 37-41)

6. **Opinion 5.** The evidence shows that game transactions face different competitive conditions compared to non-game app transactions and therefore Epic's approach, which clusters together all types of apps into an undifferentiated all-app transaction (or "distribution") market, is incorrect. The set of competing transaction platforms, the market participants on each side of the platform, and how developers typically monetize their apps all differ as between game apps and non-game apps. (§III.K, pp. 41-47)

7. Opinion 6. Dr. Evans' market definition analyses—and accordingly his conclusions regarding monopoly power—suffer from numerous economic flaws. His focus on substitutability of devices ignores that the App Store produces transactions between consumers and developers—transactions in which consumers can freely engage across platforms without replacing one device with another. Indeed, this issue does not arise for the vast majority of consumers who already own multiple devices hosting platforms for digital game transactions. (§§V.A-V.C pp. 78-80). He inexplicably carves tablets out of his market definition even though iOS apps are developed for both iPhones and iPads. (§V.D pp. 80-81) His conclusion that apps on smartphones are not substitutes for apps on other devices rests on faulty evidence. (§§V.E-V.G pp. 81-83) And his “case study” of Fortnite user behavior is uninformative for the hypothetical monopolist test he attempted to conduct yet nevertheless shows meaningful substitution across game transaction platforms. (§§V.H-V.I pp. 83-85)

Market Power

8. Opinion 7. My market share calculations support the conclusion that Apple does not have market or monopoly power in a properly defined market. Apple’s share of the digital game transaction market lies between 23.3% and 37.5%. In light of my conservative approach, these market share estimates, especially at the high end, are likely to overstate Apple’s true market share and are, in any event, inconsistent with Apple having substantial market power. The entry of new game transaction platforms is also inconsistent with Apple having market power. (§IV.A, pp. 49-53)

9. Opinion 8. Market outcomes are inconsistent with Apple having substantial market power regardless of how the market is defined. Apple’s commission rate on paid transactions is competitive with other game transaction platforms and Apple has decreased its commission rate over time for many transactions. Developers have also increasingly shifted to free-to-download apps, which do not require the developer to pay a commission to Apple. Factoring in free transactions, Apple’s average effective commission for digital game transactions is 8.1%. The total value of digital game transactions has risen for the market overall. And both the number of transactions and total developer revenues on the App Store have increased, growing at a faster rate than the market overall and other competing game transaction platforms. There is simply no evidence of any price increase or output restriction associated with the onset of monopoly power, which Dr. Evans dates to 2010. Further, despite Dr. Evans’ claims that Apple has failed to innovate, Apple has continuously invested in innovation to improve the quality of the iOS ecosystem and App Store transactions. (§IV.B, pp. 53-69)

10. Opinion 9. Apple would be constrained from exercising market power even if the relevant two-sided transaction market were defined (incorrectly) to consist of all iOS app transactions (and only iOS transactions). Several market characteristics support this conclusion. For example, developers are able to monetize their apps without paying a commission to Apple, including allowing consumers to engage in transactions outside of the app that provide content or other digital functionality that can be used within the app. Consumers can (and do in significant numbers) switch between iOS devices and Android devices, further constraining any ability by Apple to exercise market power. Further, the empirical evidence on prices and quantity is consistent with Apple being constrained from exercising market power in an alleged market for iOS app distribution. (§§IV.C-IV.D, pp. 70-77)

Competitive Effects

11. **Opinion 10.** All evidence suggests Apple's App Store model has been profoundly procompetitive. As described in connection with my market power analysis, prices are falling, entry is constant, output and value are increasing, and nonstop innovation is driving quality ever higher (which effectively lowers prices). Whether looking at just game transactions or all app transactions, the digital marketplace is thriving. Epic provides no evidence to the contrary. (§VI.C, pp. 89-91)

12. **Opinion 11.** Dr. Evans' case studies, designed to show that Apple's conduct harms competition, in fact reveal that Apple's model leads to lower prices, greater output, and higher quality. His analysis of Android app distribution in China and distribution of games on PCs and Macs suggests that developers and consumers would be worse off if Apple were forced to allow distribution outside the App Store. (§VI.A, pp. 86-87)

13. **Opinion 12.** Professor Athey's conceptual analysis of "middleware" and "multi-platform app stores" is wholly speculative and proposes a drastic form of forced interoperability to solve a problem that does not actually exist. (§VI.B, pp. 87-89)

II. Background and Qualifications

14. My name is Lorin Moultrie Hitt. I am the Zhang Jindong Professor of Operations, Information and Decisions at the University of Pennsylvania, Wharton School.
15. As a member of the information strategy and economics group at Wharton, my research and teaching focus on the economics of the information technology industry and related industries, with a specific emphasis on firms engaged in or affected by Internet-based commerce. I have conducted research on pricing and competition among online travel agents, on the effect of product recommendation services on consumer choice and product price, on switching costs and customer loyalty to online brokers (and online businesses more broadly), on consumer behavior in online services such as banking and healthcare, and on the economic impact of social media services such as Facebook and Twitter. More broadly, my research encompasses both theoretical modeling and empirical analysis of pricing, marketing, competition, and consumer behavior in online markets.
16. I have published more than 35 peer-reviewed articles in top-tier economics and management journals such as the *Quarterly Journal of Economics*, the *Review of Economics and Statistics*, the *Journal of Economic Perspectives*, *Management Science*, and *Information Systems Research*, as well as more than two dozen other publications in books, trade journals, and other practice-oriented outlets. I previously held senior editorial positions at three major research journals: *Management Science*, *Information Systems Research*, and *Journal of Management Information Systems*. I twice served on the conference committee for the Workshop on Information Systems and Economics, the primary conference in my sub-discipline.
17. I have taught courses at the University of Pennsylvania and the Massachusetts Institute of Technology on competition and customer pricing in a variety of commercial and consumer markets, information systems management, electronic commerce, information economics, data analysis, and methodologies used to understand the impact of information technology investments and strategies on firms, consumers, and markets. I created one of the first courses on the economics of electronic commerce (first offered in 1998), which I taught for over 16 years. I continue to cover similar material in my Ph.D. seminar along with theoretical and empirical methods used in economic research and their application to the study of online markets including the markets for computers, smartphones, and software (such as apps).
18. I received my Ph.D. in Management from the Massachusetts Institute of Technology Sloan School of Management in 1996 and my Sc.B. (1988) and Sc.M. (1989) degrees in Electrical Engineering from Brown University. The majority of my Ph.D. coursework was in economics and statistics. I took my Ph.D. qualifying exam in econometrics from Jerry Hausman (who developed the theory underlying one of the most common methods of testing for econometric identification), and my doctoral dissertation was supervised in part by Zvi Griliches (Harvard), a former Chairman of the American Economic Association and a pioneer in methods for understanding the relationship between prices and quality change in complex, differentiated products.

III. Market Definition: The relevant antitrust market is the market for digital game transactions

19. My market definition analysis builds on the economic frameworks set forth by Professor Schmalensee and Professor Lafontaine. Based on Professor Schmalensee's framework on two-sided markets and Professor Lafontaine's framework for defining antitrust markets, I have conducted extensive qualitative and quantitative analyses regarding the relevant product market in this case. I conclude that the evidence strongly supports that the relevant antitrust product market is the market for digital game transactions.

20. Professor Lafontaine provides a clear framework that I adopt and apply in my analysis. As she discusses, the starting point for assessing the economic effects of the conduct at issue is market definition, which requires identifying relevant substitutes for the product provided by the App Store.

21. Thus, I begin my analysis with the product that Apple jointly provides to Epic and Epic's customers through the App Store—"digital game transactions." These are transactions that facilitate the exchange of playable digital game content (including initial downloads, re-downloads, and updates) and in-app purchases of game content between developers and consumers.

22. The App Store is a two-sided transaction platform, serving both consumers and developers in making transactions with each other. As described by Professor Schmalensee, it is therefore necessary to consider substitutability for these transactions on both sides of the platform, meaning for both consumers and developers, when conducting an analysis of the relevant product market.

23. My empirical analyses and research described below support my finding that digital game transaction platforms provide services that are strong substitutes, both for the same game and across games, from the perspective of both consumers and developers of games. As discussed below, other app transactions facilitated by Apple are not strong substitutes for digital game app transactions. I therefore concluded that digital game transactions represent a distinct market. Moreover, Apple competes in this market with other digital game transaction platforms found on PCs, consoles, tablets, and other devices. Epic's assertions that there is a single-brand market for iOS app distribution in which the App Store has no competitors is therefore wrong.

A. Game developers have the option to make transactions through many platforms besides the App Store

24. When considering the options for developers to make game transactions, I started by identifying the transaction platforms that currently exist and in which consumers and developers actively make game transactions. My analysis shows that, counter to Epic's characterization of the world, there are many transaction platforms that compete in the market for digital game transactions and serve as substitutes to the App Store for developers.

25. In Figure 1 below I show a list of 14 prominent platforms that offer transaction services, by which I mean the ability to transact with consumers, to digital game developers. Each of these

platforms serve the exact function as the App Store in that they connect developers to consumers in order to conduct transactions for many different digital games.

Figure 1
Examples of digital game transaction platforms

Platform	Compatible devices
1. Amazon Appstore	Android, Fire OS, Blackberry
2. App Store	iOS devices
3. Epic Games Store	PC, Mac
4. GOG.com	PC, Mac, Linux
5. Google Play	Android, Chrome OS
6. Google Stadia	Android, Chromecast Ultra, PC, Mac, iOS devices (via Safari browser)
7. itch.io	PC, Mac, Linux, Android
8. Mac App Store	Mac
9. Microsoft Store	PC, Xbox One, Xbox Series
10. Nintendo eShop	Switch, Nintendo 3DS, Wii U
11. Origin	PC, Mac
12. PlayStation Store	PS4, PS5
13. Samsung Galaxy Store	Samsung Android
14. Steam	PC, Mac, SteamOS + Linux

Source: DX-4758

26. Developers may choose to develop certain games for only one platform—for example, an exclusive release of Gears of War 3 on Xbox. Developers may also choose to create different games for different platforms. For example, Epic released Infinity Blade on iOS, Gears of War on Xbox and PC, Gears of War 3 on Xbox, and Fortnite on PlayStation, Xbox, Switch, PC, iOS and Android. Developers can also release different versions of a game for different platforms—for example, the initial release of the Minecraft mobile version had limited features compared to non-mobile versions. It is the developer's choice where to offer its games, and hence where to transact with potential customers.

B. Many game developers choose to use multiple transaction platforms to make game transactions with consumers for a single game

27. Some developers may choose not to conduct transactions for a given game on multiple platforms. But this is not a sign that the choice was not available to them to do so. The most direct evidence that developers can transact on different game transaction platforms is the fact that many developers indeed choose to make transactions for a single game on multiple platforms. Developers commonly do this, and empirical evidence shows that a large number of game app developers that transact through the App Store also transact through other platforms.

28. My analysis of industry data provided by App Annie shows that 99 out of the top 100 grossing game apps on the App Store are also offered on Google Play. App Annie is a useful data set as it has detailed information on mobile apps. The App Annie data, summarized in Figure 2, show that the lion's share of the most downloaded and highest grossing iOS iPhone games are available on Google Play, and vice versa. Thus, the developers of these games were able to, and have chosen to, use multiple transaction platforms to make game transactions with consumers.

29. Dr. Evans misinterprets the fact that most top games are available on both the App Store and Google Play as evidence that developers do not in fact substitute between these platforms but rather that developers are trying to reach two separate set of consumers.¹ I disagree. As I will discuss later, consumers can, and do, switch between iOS and Android devices. Moreover, saying developers do not view the App Store and Google Play as substitutes because nearly all developers transact through both is no different than claiming that cereal brands do not view grocery stores as substitutes because nearly all cereal products are sold at nearly all grocery stores. The logic is simply wrong.

Figure 2
Percent of top game apps on both Android and iOS platforms (December 31, 2019)

	Top 100 by downloaded game apps	Top 100 by grossing game apps
iOS apps on Google Play	83.0%	99.0%
Android apps on App Store	95.0%	100.0%

Source: DX-4759 (summarizing DX-5408 DX-5409 DX-5410, DX-5411)

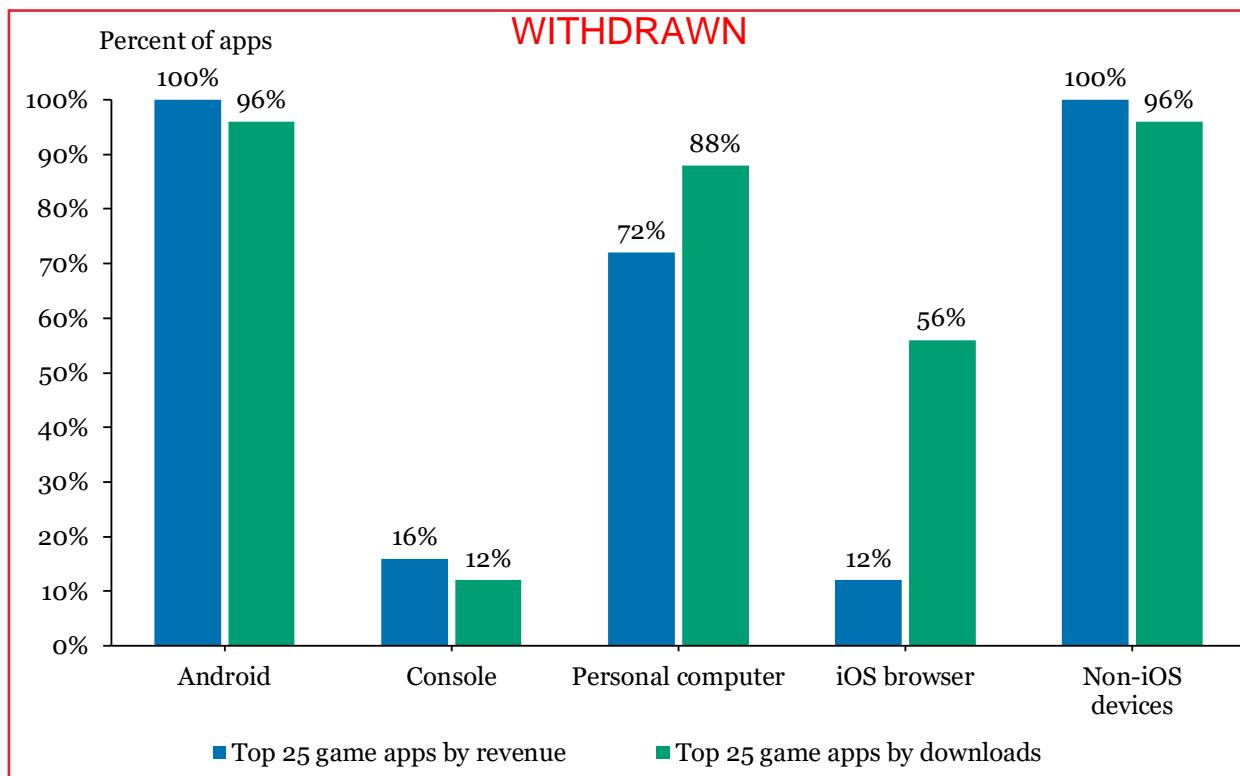
30. I also find strong evidence that developers are able to make game transactions on transaction platforms beyond the App Store and Google Play. While there is no single data source like App Annie that can be used to analyze all transaction platforms through which a developer transacts, I conducted independent research to study the top 25 game apps on the App Store, both by revenue and by downloads, in order to assess the degree to which these games were available on transaction platforms other than Google Play and the App Store. Besides Fortnite, these top game apps include popular games such as Mario Kart Tour, Pokémon GO, Roblox, Clash of Clans, Candy Crush Saga, and Homescapes. This group of top game apps is a meaningful set to study: the top 25 game apps by revenues accounted for 33% of all game app revenues while the top 25 game apps by download accounted for 12% of all game app downloads through the App Store in FY2019.

31. My analysis in Figure 3 shows that almost without exception these top game apps were available on both the App Store and on Android devices. The vast majority were also available on personal computers – i.e., developers developed the same game for the PC. And many were

¹ Evans Direct Testimony, ¶ 89.

available on consoles or were available to play on an iOS web browser, i.e., without the need to access the game on the app.

Figure 3
~~Device availability of FY2019 top 25 App Store game apps~~

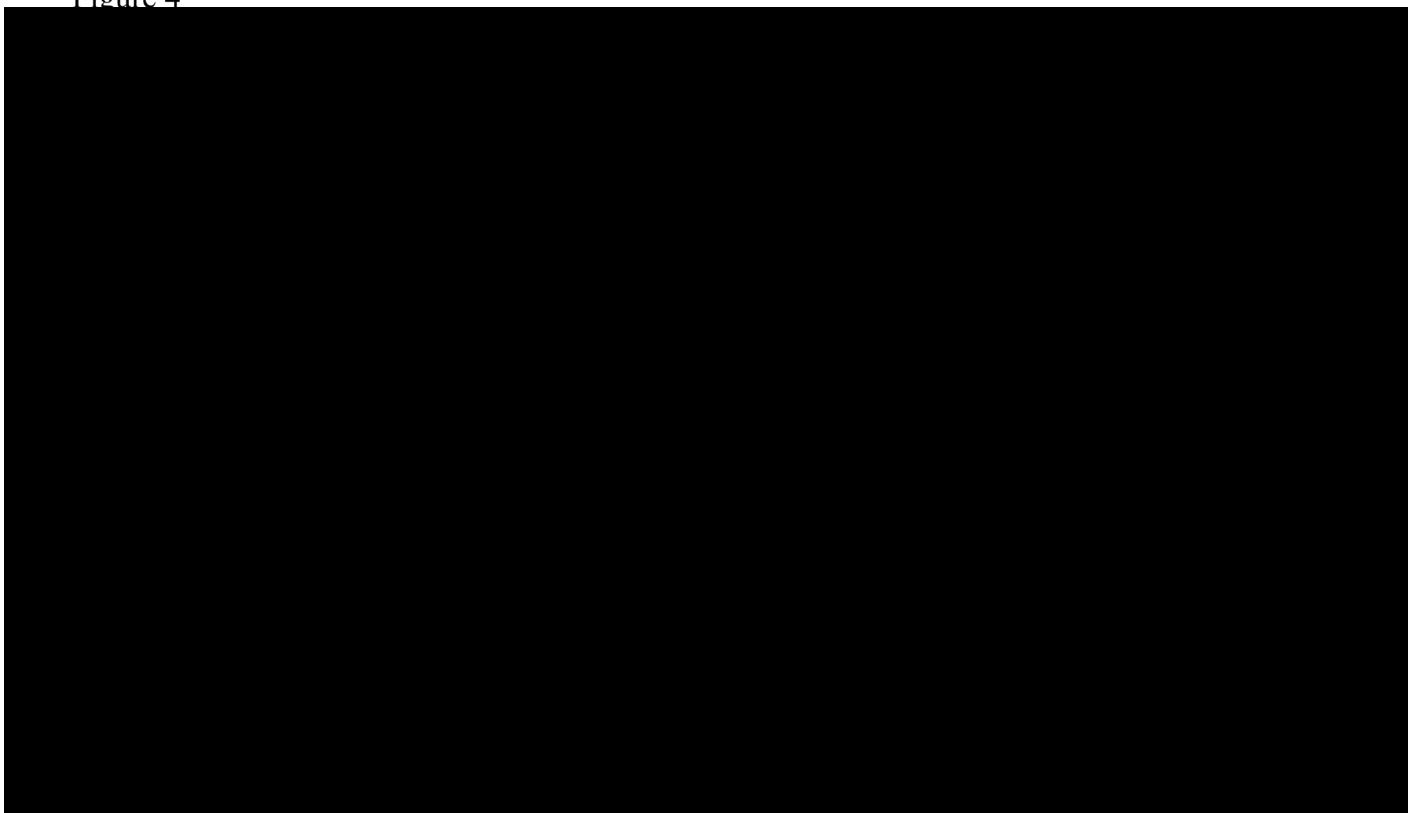


Source: DX 4775 (summarizing DX 5338 and online public materials)

32. To understand the market realities related to platform substitution, it is helpful to assess examples of how a developer might choose to develop a game (or different games) for many different platforms.

33. Minecraft, one of the best-selling video games of all time, is available through many different transaction platforms including the App Store, Google Play, Microsoft Store, Amazon Appstore, Nintendo eShop, and PlayStation Store, as well as directly from Minecraft's website. While the initial mobile version of Minecraft had pronounced differences from non-mobile versions, Mojang (the developer of Minecraft) was still able to conduct game transactions on mobile devices. Over time, Mojang invested in a mobile version of Minecraft with added functionality, making it even more comparable to the PC and console versions. Figure 4 shows the percentage of Minecraft game purchases across different devices in 2020. There are a significant number of transactions made across these platforms, including on platforms on PCs, consoles and mobile devices.

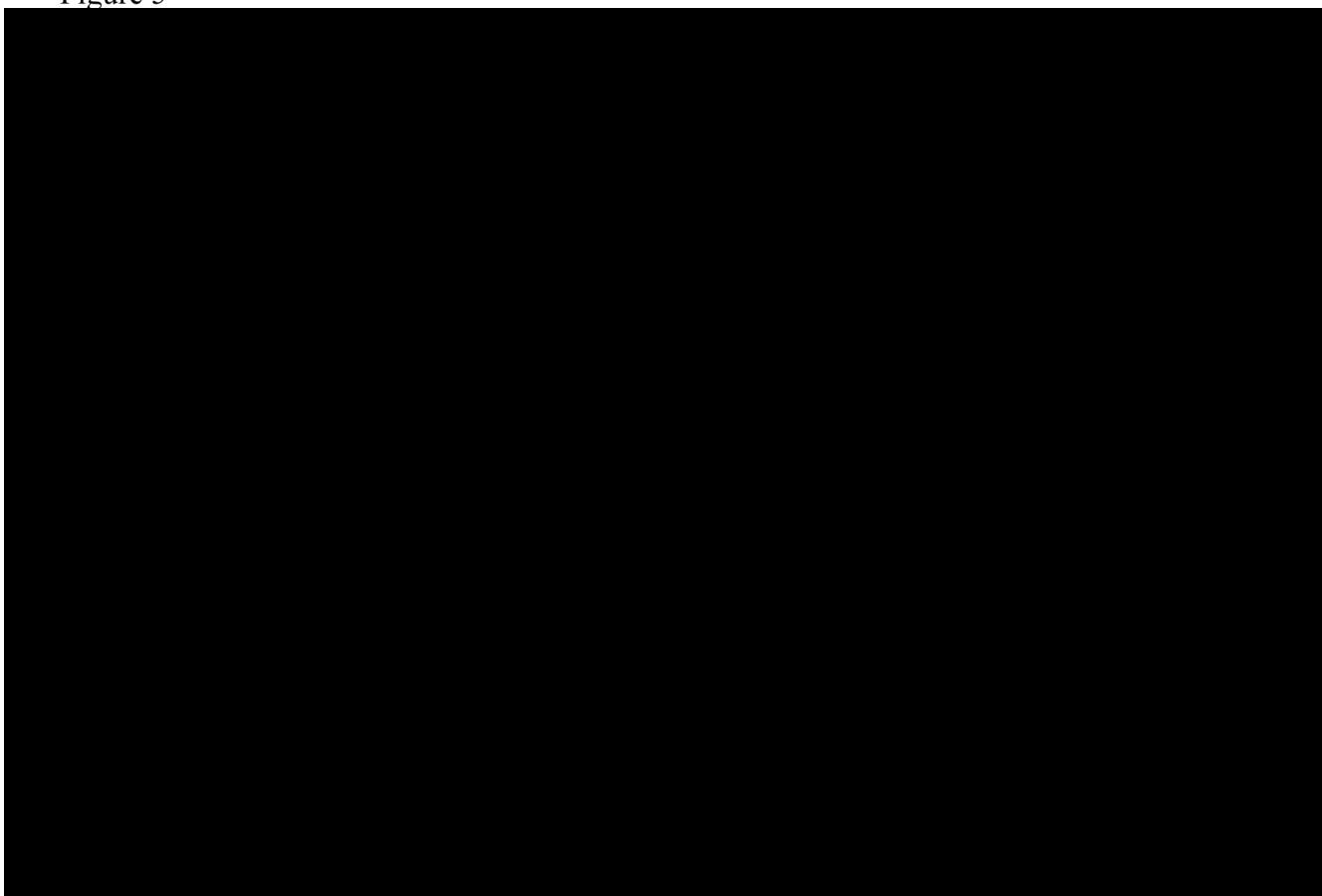
Figure 4



Source: DX-4760 (summarizing DX-3918)

34. Roblox, a game with 150 million monthly active users in May 2020, is available for iOS devices through the App Store as well as the Microsoft Store, the Amazon Appstore, and Google Play.

Figure 5



Source: DX-3879

35. Another example comes from Epic's own business strategy. Epic transacts with Fortnite customers on many game transaction platforms, including:

- The Epic Games Store for transactions on Windows PCs, Windows tablets, and Mac computers.
- The Nintendo eShop for transactions on Nintendo Switch and Switch Lite.
- The Xbox Marketplace on the Microsoft Store for transactions on Microsoft's Xbox One, Xbox Series X, and Xbox Series S.
- The PlayStation Store for transactions on PS4 and PS5.
- The Samsung Galaxy Store for transactions on Samsung-brand Android smartphones and tablets.
- GeForce Now, a game streaming platform that consumers can access on a variety of devices including Macs, PCs, Chromebooks, Android devices, and iOS devices.²

36. While Epic's behavior does not define the boundaries of the market, Epic's choice to transact on many game transaction platforms puts the role of the App Store as one of many available

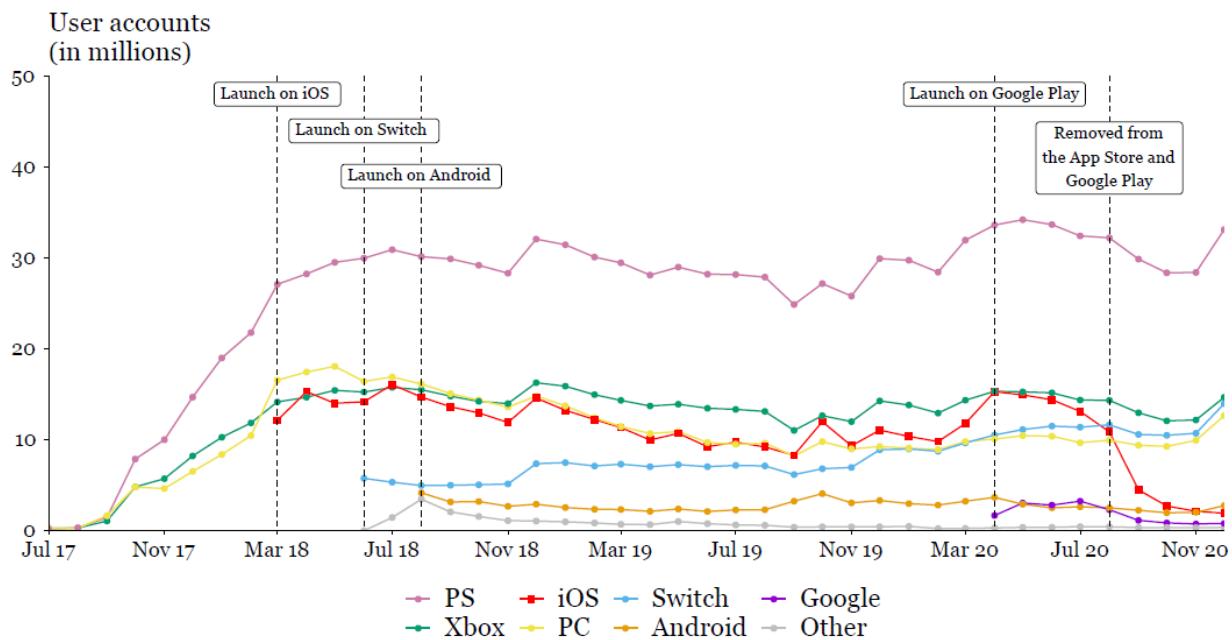
² Previously Epic transacted through the App Store for transactions on iOS devices and Google Play for transactions on Android devices.

game transaction platforms into perspective. Epic's data are also helpful in this case because they allow me to examine how individual consumers of the same game transact across platforms.

37. In particular, I analyzed a dataset containing monthly playtime and spending for over 350 million Fortnite users from January 2017 to December 2020. I understand that these data capture all Fortnite users across the globe.

38. These data show that Epic makes transactions with the majority of its users through game transaction platforms other than the App Store (see Figure 6). Before the release of Fortnite on iOS, Fortnite had already attracted 64 million users through other devices and transaction platforms. The number of accounts that accessed the game on other platforms also continued to grow after the launch of Fortnite on iOS. In fact, prior to the removal of Fortnite from the App Store, the game had 355 million distinct user accounts, only about one-third of which had accessed the game through iOS.

Figure 6
Worldwide Fortnite user accounts by platform (July 2017 – December 2020)



Source: DX-4761 (summarizing DX-5339, DX-4314, DX-3686)

39. My analysis overall shows that game developers in general have many choices of where and how to conduct game transactions with consumers and that they actively choose between these game transaction platforms. My analysis also shows that Epic in particular has been extremely successful in conducting game transactions through these other game transaction platforms.

C. Developers, including Epic, treat the App Store and other game transaction platforms as substitutes for making game transactions

40. Developers substitute across game transaction platforms in part by making decisions about whether, when, and how much to invest in a given game for a particular transaction platform.

41. My research for this case shows that developers consider the relative benefits of different game transaction platforms along multiple dimensions in deciding on what platforms to transact. This includes the ability to generate revenue through the platform, the commission charged by the platform, the technical sophistication of the devices on which the platform is available, the developer tools available to aid the developer in creating the game, the number of consumers on the platform, the amount those consumers might be expected to spend on the platform, and other services provided directly by the platform operator to the developer. These are dimensions upon which digital game transactions compete with one another for developers. And as my analysis above shows, developers have the ability to substitute between these platforms depending on these factors—this includes choosing which games, and which versions of games, to offer on each game transaction platform.

42. My research also shows that many technical tools exist to provide developers the maximum set of options in terms of choosing among platforms on which to make game transactions. For example, the Unity game engine now supports development for 20 platforms, allowing developers to create one software “build” that they can distribute to any of Unity’s supported platforms. These tools, combined with the evidence above that developers have created games for multiple platforms, make it clear that developers are not locked in to any given platform. Instead, developers can choose between different transaction platforms based on those platforms’ economic merits.

43. Documentary evidence I have reviewed for this matter support this exact dynamic. Evidence shows that Epic considered the App Store and other game transaction platforms as alternatives and made a deliberate choice to focus mobile development efforts for Fortnite on iOS based on an assessment of the merits of the iOS platform.

44. Fortnite was first launched on Xbox, PlayStation, and PCs. Epic then decided to “focus [its] engineering efforts” for Fortnite on iOS as opposed to launching on both iOS and Android simultaneously.³ This demonstrates Epic’s willingness to reallocate resources across transaction platforms depending on their relative advantages. Furthermore, Epic expected to receive “extra support” from Apple by launching on the App Store rather than Google Play, which is consistent with Epic’s understanding that Apple treats Google Play as a competing transaction platform.⁴

45. Similarly, Epic’s strategy to initially forgo offering Fortnite on Google Play shows that Epic considered alternative game transaction platforms for the game. Emails between Tim Sweeney and Samsung indicate that Epic did not want to partner with Google and decided to instead offer transactions for Fortnite for Android devices through the Samsung Galaxy Store instead of

³ DX-3732.002-003

⁴ DX-3732.002

Google Play, even using its competitive leverage to obtain a lower commission rate for Fortnite with Samsung.⁵

46. Developers of course do not always choose to offer every game on every platform, or even every game on multiple platforms. But this does not mean that different transaction platforms are not substitutes merely because the developer chose where to invest its efforts across games. Epic has itself weighed the benefits of game transactions on different platforms against each other for different games. For instance, while Epic developed and released the Infinity Blade trilogy only on the App Store, its Gears of War 3 (released after Infinity Blade) is exclusive to Xbox. Fortnite is available on many different game transaction platforms because Epic has chosen to invest in making it so, while other developers, choosing fewer platforms on which to transact, have not.

D. Game developers who have decided to make games for iOS devices have multiple options for making paid transactions with iOS users outside of the App Store, even for content consumed on iOS apps

47. My analysis of the market for game transactions shows that beyond the choice on which of the many substitute transaction platforms to offer any given game, developers also have meaningful design choices available to them that impact where and how consumers will pay them for their games, i.e., make game transactions.

48. In regard to iOS apps, developers can use competing game transactions platforms, as well as websites, for paid transactions with consumers, even for in-game content that is used in an iOS app. It is thus demonstrably wrong to claim, as Epic's economists do, that game developers can transact with Apple mobile device users only through the App Store and therefore other game transaction platforms are not part of the relevant market.

49. Developers have many design choices that allow them to sell digital content on other platforms that differ from where that content is consumed. I show that these design choices are commonly used by developers for the top game apps in the App Store, facilitating the ability to substitute between transaction platforms.

50. Many game developers link in-game content and game progression across a user's devices through a common user account (or “single sign-on”). This single sign-on can be offered by the developer or through a third-party (such as Apple, Google or Facebook) and lets consumers easily shift their play and in-game content across devices. My Figure 7 shows that the vast majority of the highest grossing game apps on the App Store and a large portion of the most downloaded game apps on the App Store offer single sign-on and allow users to port in-game content and progression across devices.

⁵ DX-4457

Figure 7
Portability of FY2019 top game apps in the App Store

App Category	Offer single sign-on	Offer full or partial portability
Top 25 by revenue	92%	84%
Top 25 by downloads	32%	32%

Source: DX-4777 (summarizing DX-5338, DX-4324, online public materials)

51. Many game developers also allow consumers to purchase digital content that will be used within iOS from alternative transaction platforms or through a website. Figure 8 shows that the vast majority of the highest grossing game apps allow consumers to purchase content outside the iOS app for use within the iOS app, and ~~a full~~ almost one-third offer direct purchases of content through a web browser on the iOS device for content that can be accessed in an iOS app.

Figure 8
Monetization and portability of FY2019 top game apps in the App Store

App Category	For apps offering purchased digital content		
	Offer digital content for purchase	Content purchased outside of iOS app accessible in iOS app	Content purchased through web browser accessible in iOS app
Top 25 by revenue	100%	84%	32%
Top 25 by downloads	100%	28%	8%

Source: DX-4798 (summarizing DX-5338, DX-4324, online public materials)

52. Epic is an excellent example of a game developer that has chosen to invest in making these various features available in its games, allowing consumers to seamlessly substitute digital game transactions for the same game across transaction platforms (when supported by the platform, as Apple does).

- Epic allows consumers to play Fortnite and to pay for V-bucks (Fortnite's digital currency) on different platforms.
- Consumers' ability to purchase V-Bucks and the ability to acquire in-game content using V-Bucks is functionally identical across devices.
- Customers have device-agnostic accounts, linked through a single sign-on, that allow them to access their V-bucks on any device. (V-bucks purchased on the PlayStation Store or the Nintendo eShop are an exception because of restrictions imposed by those platforms.)

- Once content is purchased in-game with V-Bucks, it is tied to the user's account and can be accessed and used across any device.
- In-game progress is tied to a user's Fortnite account. This progress persists across all devices that offer Fortnite, allowing users to continue playing on one device where they left off on another.
- Consumers using different devices can play with each other simultaneously without restrictions (known as "cross-play"). This cross-play functionality allows players to switch devices without affecting their ability to play with others. This limits the potential for network effects on a single device to discourage users from switching to a different device.

53. In fact, as shown above, if a developer chooses, it can let consumers make transactions through substitute platforms, or websites, even for content used in the iOS app. Epic has made it possible for a Fortnite user on iOS to choose to never make a single paid transaction through the App Store but still enjoy all the paid features of the game when playing on an iOS device. A Fortnite user can simply use content acquired on other devices or through a website on their iOS device, and can also spend V-bucks purchased on competing game transaction platforms for digital content used when playing on iOS.

54. Overall, the evidence above clearly demonstrates that developers have the option to conduct digital game transactions across platforms and can substitute between platforms for transacting with consumers, both within and across games on different game transaction platforms, and even for content consumed within iOS apps.

E. Empirical evidence shows that consumers treat game transactions on other transaction platforms as substitutes for game transactions on the App Store

55. The fact that developers have so many options to offer game transactions to consumers is mirrored by the fact that consumers have many options available to make digital game transactions—this connection is a fundamental feature of two-sided platforms. I conducted a number of analyses in order to assess whether consumers can, and do, substitute across game transaction platforms.

- First, I assessed the degree to which consumers use, own, or have access to multiple devices on which game developers offer games—this establishes that consumers multi-home across relevant devices for game transactions and have the ability to switch among devices.
- Second, I assessed the degree to which consumers play games across multiple devices—this establishes additional support for the fact that consumers do indeed multi-home when making game transactions across devices and across games.
- Third, I assessed the degree to which consumers could multi-home within the most popular games, for example playing or paying for content for the same game across different devices. I analyzed this in detail through data provided by Epic.
- Finally, I assessed real world examples that show how consumers actively substitute across game transaction platforms for making game transactions.

These analyses together show that consumers can and do substitute digital game transactions across different devices through the various game transaction platforms available on those devices.

F. Consumers can make transactions across many platforms because they own or regularly use different devices on which game transaction platforms are available

56. The first type of evidence I assessed was whether consumers regularly use, own, or have access to other devices besides iOS devices. The evidence on this front was clear, and confirmed by a number of different sources.

57. Multiple surveys show that consumers do in fact use, own, or have access to multiple devices on which they can make game transactions. For instance, a 2019 study of all U.S. consumers shows that 81% owned a smartphone, almost 75% owned a desktop or laptop computer, and approximately 50% owned a tablet.⁶ These general observations also hold for owners of iOS devices. An Apple survey of iPhone owners conducted in July 2020 found that 44% owned a Mac notebook or desktop, 55% owned a Windows PC laptop or desktop, 30% owned a gaming console, and 21% owned a non-iPad tablet (such as a Samsung or Amazon Fire tablet).⁷ These findings are consistent with the opinion of Professor Athey who opined that consumers typically have access to two to three general purpose devices.

58. Two surveys conducted for this case by Professor Hanssens also find that consumers use, own, or have access to multiple devices besides their iOS device. As my Figure 9 shows below, according to Professor Hanssens' survey, 81% of App Store users regularly use another device besides their iOS device. Professor Hanssens' survey finds that an even greater amount regularly use or have access to another device besides their iOS device: 86% regularly use or have access to a laptop, 64% a desktop, 61% a console/handheld game device, 56% a non-iOS smartphone, and 48% a non-iOS tablet. Overall, 95% of App Store users regularly use, or could use, a device besides their iOS device. The results are similar when looking at the more specific group of consumers who play Fortnite on an iOS device. Of this group almost all (i.e., 94%) regularly use other devices besides their iOS device.

⁶ DX-4453

⁷ DX-3174.003-004

Figure 9
Other electronic devices used by iOS App Store users

Device	Regularly Used This Device in the Last 12 Months	
	Number of Respondents (n=500)	Percentage of Respondents
Smartphones with Non-iOS Operating Systems	136	27%
Android	108	22%
Microsoft	66	13%
Tablets with Non-iOS Operating Systems	116	23%
Android	90	18%
Microsoft	57	11%
Laptops	357	71%
Apple	182	36%
Brands Other Than Apple	252	50%
Desktops	238	48%
Apple	111	22%
Brands Other Than Apple	178	36%
Gaming Consoles and/or Handheld Gaming Devices	206	41%
Nintendo Switch (including Nintendo Switch Lite)	104	21%
PlayStation (PS Series Console)	125	25%
Xbox	106	21%
Nintendo DS Series	52	10%
PlayStation Vita	28	6%
GPD XD Plus	6	1%
Other Electronic Devices	458	92%
Other Electronic Devices (Non-Apple)	405	81%

Source: DX-4661

59. The fact that owners of iOS devices use, own, or have access to multiple other devices that provide game transactions means that these consumers can make game transactions on them.

G. Consumers can make transactions across many platforms because they play games on the many devices they own

60. My analysis shows that consumers play games across multiple devices and thus are already making game transactions through different platforms.

61. Survey data show that consumers play games and can make digital game transactions across devices and transaction platforms. Professor Hanssens' survey, for instance, found that 92% of iOS Fortnite players also play games on non-iOS devices. Additionally, a 2018 industry survey of game players showed that 59% of U.S. gamers play games on more than one device and 29% on more than two devices.⁸ This study found that 56% of gamers play on a mobile device and "at least one other platform," and that 27% "play on Mobile, PC & Console."⁹ These sources show

⁸ DX-4170.010

⁹ DX-4170.011-012

that consumers play games and can make digital game transactions across devices and transaction platforms.

62. Substitution of game transactions by consumers is not of course limited to the same game across game transaction platforms. Evidence indicates that cross-game substitution is common. For example, Professor Hanssens' survey found that 92% of iOS Fortnite players play games on non-iOS devices. Epic's own data indicate that 35.9% of iOS Fortnite players also play Fortnite on non-iOS devices.¹⁰ The difference in these two statistics indicates that many iOS Fortnite players play other games on non-iOS devices, even if they do not play Fortnite on non-iOS devices.

63. Even this high degree of substitution between devices may of course understate the opportunities for consumers to play or transact on other devices if they chose or were incentivized to do so. In other words, just because consumers do not substitute game transactions across devices now does not mean they would not do so if faced with a price increase on one particular platform.

H. Consumers can and do substitute game transactions through the App Store with transactions through other game transaction platforms

64. As I have already described in my analysis of top game apps, many developers offer versions of their games on multiple devices. Because of this, consumers can not only substitute game transactions between platforms for different games but can also substitute game transactions for the same game on different game transaction platforms.

65. My analysis also assesses actual consumer spending and use across game transaction platforms to show that they are technical substitutes. While I have already established that consumers own, access, and regularly use multiple devices on which to make game transactions and that consumers play games on these same devices, the goal of this analysis is to assess individual consumers and their actual game transactions across platforms to provide insights into how consumers substitute across game transaction platforms.

66. The only data available to me that tracked individuals and their play and purchase decisions across game transaction platforms are the Epic data. While these data are limited to just one game (Fortnite), they are instructive because they exhibit both the scope of substitutes available to developers and the consumer substitution behavior in regard to playing and making paid game transactions.

67. My analysis of the Epic data led me to the strong conclusion that consumers can and do substitute game transactions across devices and transaction platforms. Dr. Evans agrees with me on this basic fact. The Epic data establish a number of important facts in support of this conclusion, including that consumers often multi-home within Fortnite generally, that iOS consumers in particular do, and that there is ample evidence that iOS users substitute their paid transactions for transactions on other platforms.

¹⁰ DX-4767

68. I first assessed the Epic data to show that Epic's customers generally play Fortnite on multiple devices and make transactions through multiple game transaction platforms. For example, about a third of all Fortnite users have an iOS account, as shown in Figure 10. Yet, as I show in Figure 11 below, the Fortnite data also show that Fortnite users spent the vast majority (95.6%) of their time playing Fortnite on non-iOS devices. For time played, iOS ranks fifth overall, trailing Sony PlayStation, Microsoft Xbox, PC, and Nintendo Switch.

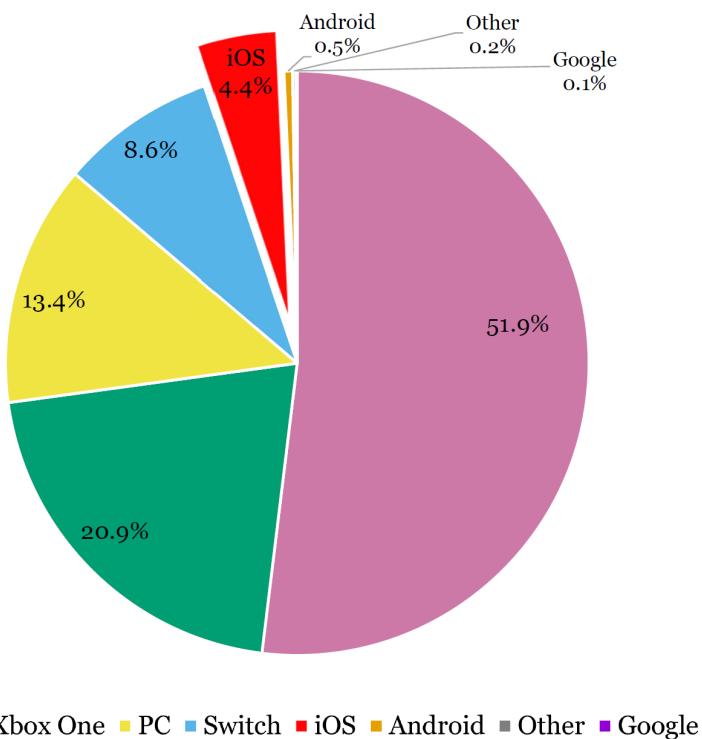
Figure 10
Worldwide share of Fortnite user accounts across platforms (March 2018 – July 2020)

Platform	User accounts (in millions)	
	Count	Percent
1. PS4	104	30.2%
2. Xbox One	53	15.5%
3. PC	90	26.1%
4. Switch	31	9.0%
5. iOS	115	33.4%
6. Android	31	9.1%
7. Google	8	2.2%
8. Other	10	2.9%
9. Total	344	-

Source: DX-4765 (summarizing DX-5339)

Note: Percentages do not total to 100% because a user can have accounts on multiple devices.

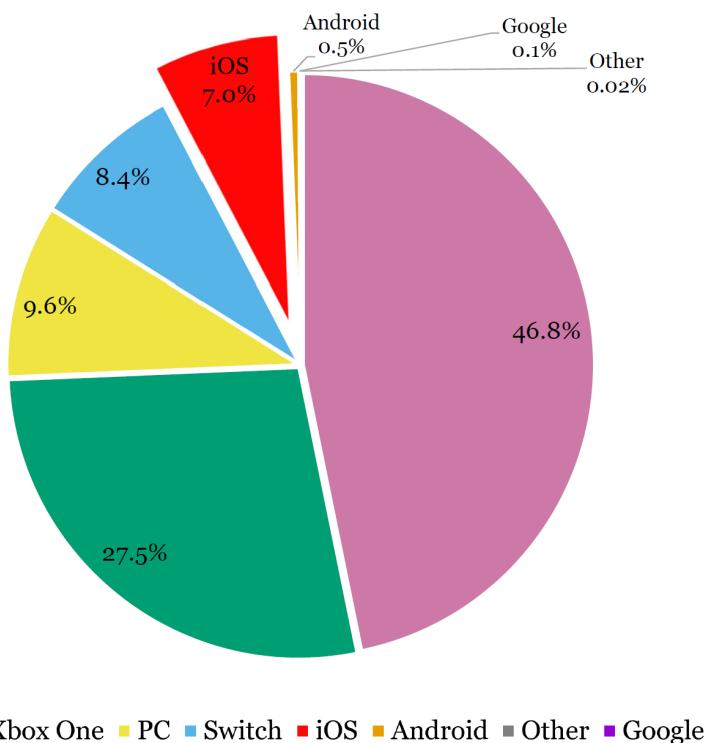
Figure 11
Percent of worldwide Fortnite time played across platforms (March 2018 – July 2020)



Source: DX-4765 (summarizing DX-5339)

69. Fortnite users also make the vast majority of their paid transactions outside of the App Store. As I show in Figure 12, only 7% of revenue from Fortnite users is collected through the App Store —again ranking fifth behind PlayStation, Xbox, PC, and Switch.

Figure 12
Percent of worldwide Fortnite revenue across platforms (March 2018 – July 2020)



Source: DX-4766 (summarizing DX-5339)

70. I then assessed the extent to which individual Fortnite users on a given transaction platform multi-home by playing Fortnite on other devices. These multi-homing users can easily shift game transactions from one particular game transaction platform, such as the App Store, to another platform, either for the same game or for other games.

71. I found that for each platform on which Fortnite is available, a large number of Fortnite users already play Fortnite on at least one additional device. These users could therefore make game transactions for Fortnite through those different game transaction platforms. My Figure 13 shows more than a third of iOS Fortnite users, and more than 40% of Fortnite players on PC, have played the game on at least one other device. This demonstrates that these consumers can easily substitute game transactions through other platforms.

Figure 13
Worldwide user accounts that access Fortnite through multiple platforms (March 2018 – July 2020)

Platform	Total users (in millions)	Percent of users that are multi-platform users
1. iOS	115	35.9%
2. PS4	104	32.1%
3. PC	90	42.4%
4. Xbox One	53	33.0%
5. Android	31	53.7%
6. Switch	31	34.7%
7. Hong Kong	10	5.9%
8. Google	8	54.4%
9. Other	0	99.8%

Source: DX-4767 (summarizing DX-5339)

72. I then focused specifically on consumers who play Fortnite on iOS devices to confirm that these users also play and transact on multiple devices and transaction platforms. I found that they do. My analysis shows that Epic can and does use alternative game transaction platforms to transact with consumers who access Fortnite through an iOS device.

73. Not only do most Fortnite users spend most of their time and money outside iOS, as I have already shown, but my analysis in Figure 14 shows that even the specific subset of users who accessed Fortnite on iOS spent the vast majority of their time and money with regard to Fortnite on non-iOS devices and through game transaction platforms other than the App Store. This is direct evidence that these iOS users have and use substitutes to the App Store for making game transactions.

Figure 14
Percent of worldwide time played and revenue by user accounts that accessed Fortnite through iOS (March 2018 – July 2020)

Platform	Hours played (in millions)		Revenue (in millions)	
	Hours	Percent	Revenue	Percent
1. iOS	2,752	10.2%	\$745	13.2%
2. Other platforms	24,219	89.8%	\$4,890	86.8%
3. Total	26,971	100.0%	\$5,635	100.0%

Source: DX-4763 (summarizing DX-5339)

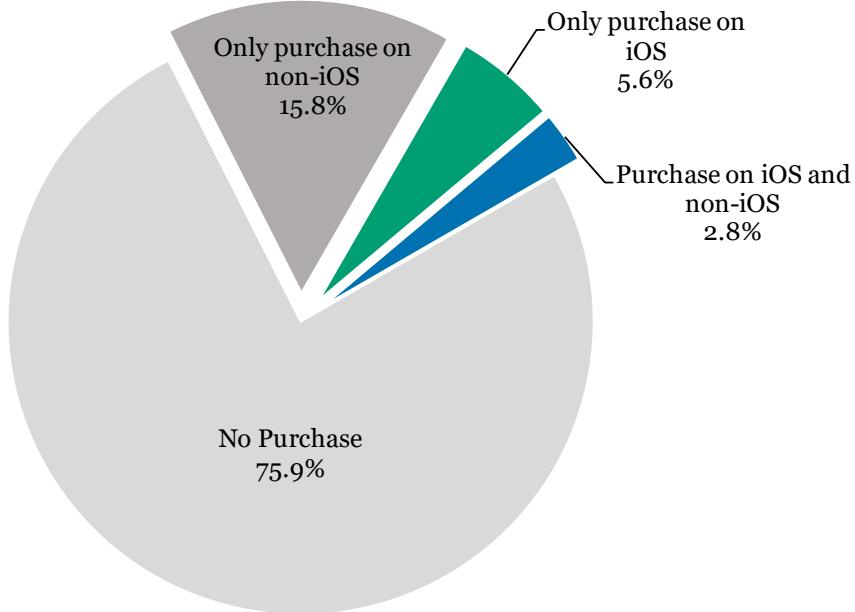
74. Data on where Fortnite customers choose to make in-game purchases show that transaction platforms are substitutes for consumers to engage in game transactions. While the majority of Fortnite's iOS users do not make paid Fortnite transactions on any devices, of those that do, well

over half chose to do so on competing transaction platforms rather than the App Store. Epic data, summarized in Figure 15, show that between January and July 2020:

- 75.9% of iOS Fortnite users did not make a purchase at all;
- 15.8% of iOS Fortnite users only made a purchase on non-iOS platforms;
- 5.6% of iOS Fortnite users only made a purchase on iOS; and,
- 2.8% of iOS Fortnite users made a purchase on both iOS and a different platform.

75. That iOS Fortnite users are choosing to make in-game transactions on platforms other than iOS indicate that other game transaction platforms are substitutes to the App Store for Fortnite consumers to make paid game transactions.

Figure 15
Purchasing behavior of worldwide user accounts that access Fortnite through iOS (January 2020 – July 2020)



Source: DX-4769 (summarizing DX-5339)

76. These Epic data in their entirety show that consumer multi-homing by Fortnite users is commonplace and results in different game transaction platforms being substitutes for consumers to make paid game transactions. They also show that consumers are able and willing to acquire game content and play a game on different platforms when developers make that option available, allowing them to substitute transactions across platforms even if they choose to play a particular game on iOS.

I. Evidence shows that developers and consumers substitute across game transaction platforms, even in the absence of a relative price change incentivizing them to do so

77. Game transactions on the App Store are substitutes, rather than complements, for game transactions on other game transaction platforms. This is true by the very nature of game transactions: any digital game transaction made through an alternative transaction platform or a website is a direct, technical substitute for a game transaction made through the App Store.

78. Consumers and developers of course substitute across game transaction platforms when a consumer chooses to play a game app on a non-iOS device. But consumers and developers can also substitute payment for content across transaction platforms, even if a consumer uses the content in an iOS app. This is because consumers can pay for content on one transaction platform and access that content on another transaction platform. In other words, any observed paid transaction on one platform is a technical substitute for a paid transaction on an alternative platform or through a developer's website, even if a consumer is using the content in an iOS app.

79. Epic's experts recognize that most consumers own multiple devices and can conduct game transactions both through the App Store and through other platforms. But they incorrectly characterize these other platforms as complements rather than substitutes. As one example, Professor Athey simply asserts that devices are complements based on her casual observations that consumers use devices in different situations (like when watching TV on the couch or while working at home). Neither she, nor Epic's other experts, actually test whether devices are complements (i.e., goods for which a decline in price for one good leads to an increase in demand for the other good) based on the standard economic approach of looking at what happens to the quantity of one good when the price of another good changes.

80. Epic's experts' assertions are simply wrong. A digital game transaction on the Sony PlayStation store is a substitute for a digital game transaction on the App Store even if a consumer chooses to make transactions on both of those platforms (and even if a consumer chooses to make transactions in a different game), just as a Honda and a Toyota are substitutes even if a consumer purchases both.

81. Real world examples prove this point. Even in the absence of a change in price on the App Store that would incentivize consumers to substitute to other transaction platforms, these examples show that developers and consumers treat transactions on other game transaction platforms as economic substitutes, not complements, for game transactions on the App Store. In particular, I analyzed five real world examples, three involving game transactions and two involving non-game apps, all of which show that transactions on other platforms are substitutes for transactions on the App Store: (1) users who download a console or PC game transaction app, (2) the launch of Fortnite on the Nintendo Switch, (3) the removal of Fortnite from the App Store after the Hotfix, (4) Spotify's decision to stop offering subscriptions for in-app purchase on iOS, and (5) Netflix's decision to stop offering subscriptions for in-app purchase on iOS.

i. Analysis of users who downloaded a console or PC game transaction platform companion app

82. First, to assess whether users substitute between game transactions on the App Store for transactions on PCs and consoles, I analyzed iOS device users who downloaded a free companion app for console or PC game transaction platforms (e.g., the Nintendo Switch Online companion app, the Xbox companion app, and the Steam Mobile companion app). This analysis (and many of my other analyses) uses Apple transaction data containing all initial downloads (but not updates or re-downloads) and in-app purchases since the launch of the App Store until September 2019, allowing me to calculate total spending on game apps for all iOS device owners.

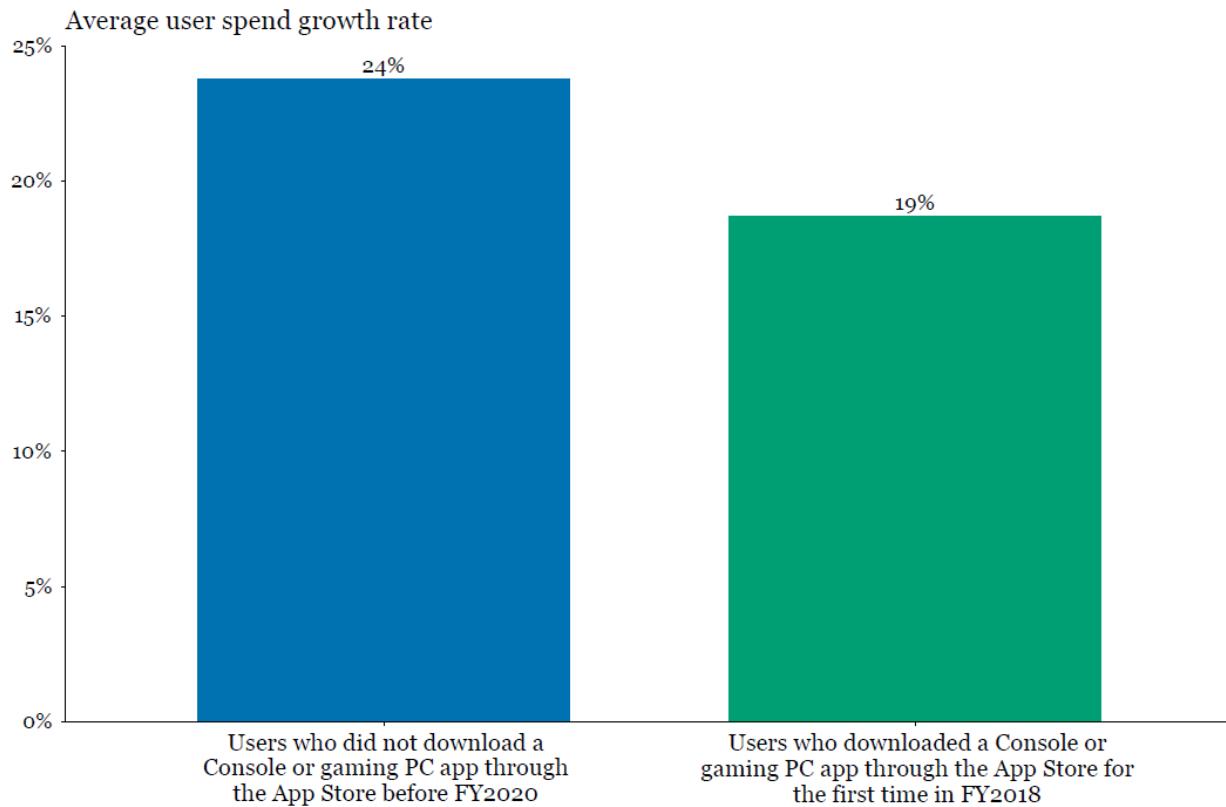
83. The download of these companion apps serves as a proxy for whether a user owns and plays games on a console or a PC. While I do not have data on which iOS users own a game console or play PC games, this proxy variable approach will identify individuals who have likely started playing games more frequently on a console or PC. This could be because the user has recently purchased a console or gaming PC or just because the user has decided to start playing games more on an existing console or PC. But either way, if transaction platforms on consoles and PCs are substitutes for the App Store, I would expect to see a decline in spending on games after users download a companion app.¹¹

84. My results find exactly that. iOS device users who downloaded a companion app in 2018 had less spending growth on iOS games between 2017 and 2019 compared to “control group” users who did not download a companion app prior to or in FY2019. The difference in growth rates between users who did and did not download such a companion app is 5.1 percentage points (Figure 16). The decline in relative spending for users who downloaded a companion app could reflect both shifting of transactions from the App Store to a competing platform for the same game the user would have purchased through the App Store or the user’s choice to purchase an entirely different game.

85. I checked other sensitivities of this analysis, and the result is robust: users who downloaded a companion app for console or PC game transaction platforms shifted at least some of their game transactions from the App Store to other transaction platforms, indicating that these other platforms are substitutes for the App Store.

¹¹ There may be a concern that the companion app proxy variable is imperfect if, for instance, users who own a console or play games on a PC do not download a companion app. This would only imply that my estimate is conservative. If many users who own a console or play games on a PC do not download a companion app then my analysis would underestimate the decline in spending for users who download a companion app relative to the control group.

Figure 16
Comparison of growth rates in iOS games spending between 2017 and 2019



Source: DX-4792 (summarizing DX-5338)

ii. The launch of Fortnite on the Nintendo Switch

86. Another real world example that shows that game transactions on other platforms are substitutes for game transactions on the App Store, even in the absence of a price increase, is my analysis of the launch of Fortnite on the Nintendo Switch.

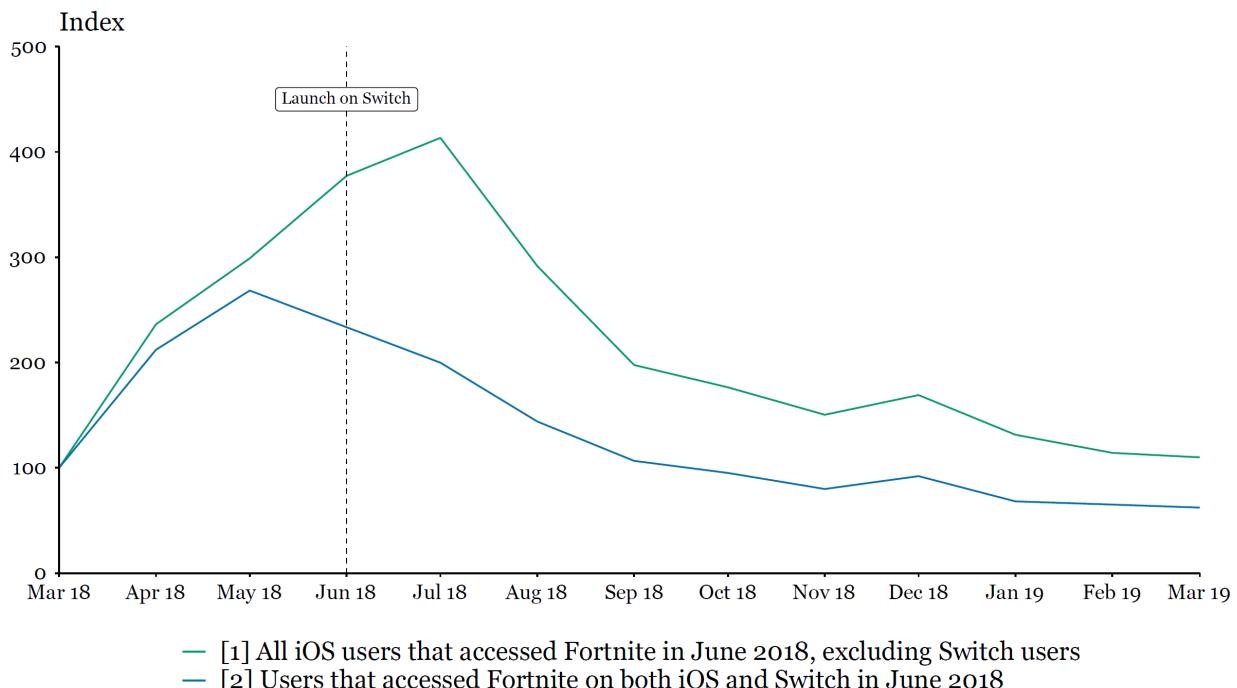
87. Fortnite launched on the Nintendo Switch in June 2018. To determine if the App Store is a substitute for the Nintendo eShop (the game transaction platform available on the Nintendo Switch), I looked at users who played Fortnite on both devices in the first month the game was available on the Nintendo Switch to see if there was a relative decline in iOS playtime and spending on Fortnite. The results of my analysis clearly show that these users shifted their playtime and spending away from iOS following the launch of Fortnite on the Nintendo Switch.

88. To understand this analysis, it is first important to note that spending on Fortnite fell for most months I analyzed compared to May 2018 (the month prior to the release of Fortnite on the Nintendo Switch). For example, from May 2018 to March 2019, Fortnite spending fell by 18% on the App Store and by 33% across all platforms.

89. Thus, to account for the decline in overall spending on Fortnite, it is necessary to compare users who played Fortnite on both iOS and the Nintendo Switch in June 2018 to a “control group.” In particular, I compare the playtime and spending on iOS for these users to a “control group” of users who played the game on iOS but not the Nintendo Switch in June 2018.

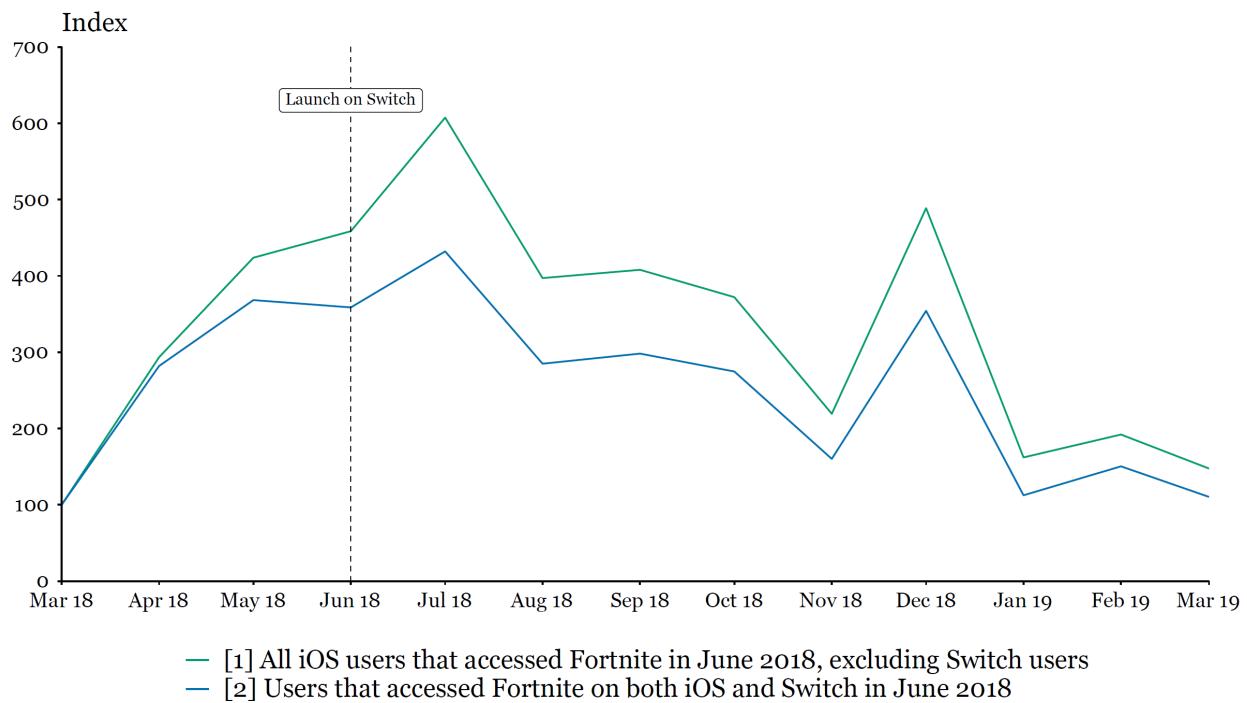
90. Figure 17 and Figure 18 clearly illustrate the findings. Fortnite users who accessed the game on both iOS and the Nintendo Switch in June 2018 played Fortnite on iOS devices less and spent less in the App Store in June 2018 and subsequent months (particularly in the months immediately after June 2018) compared to other iOS users. While this analysis cannot capture competition for new users who may have chosen to start playing and spending on the Nintendo Switch rather than on iOS, it nevertheless shows that existing iOS Fortnite users substituted transactions between iOS and the Nintendo Switch after Fortnite became available on the Nintendo Switch.

Figure 17
Worldwide Fortnite iOS time played by user accounts that accessed Fortnite on an iOS device in June 2018 (March 2018 – March 2019)



Source: DX-4822 (summarizing DX-5339, Nintendo, “Fortnite”)

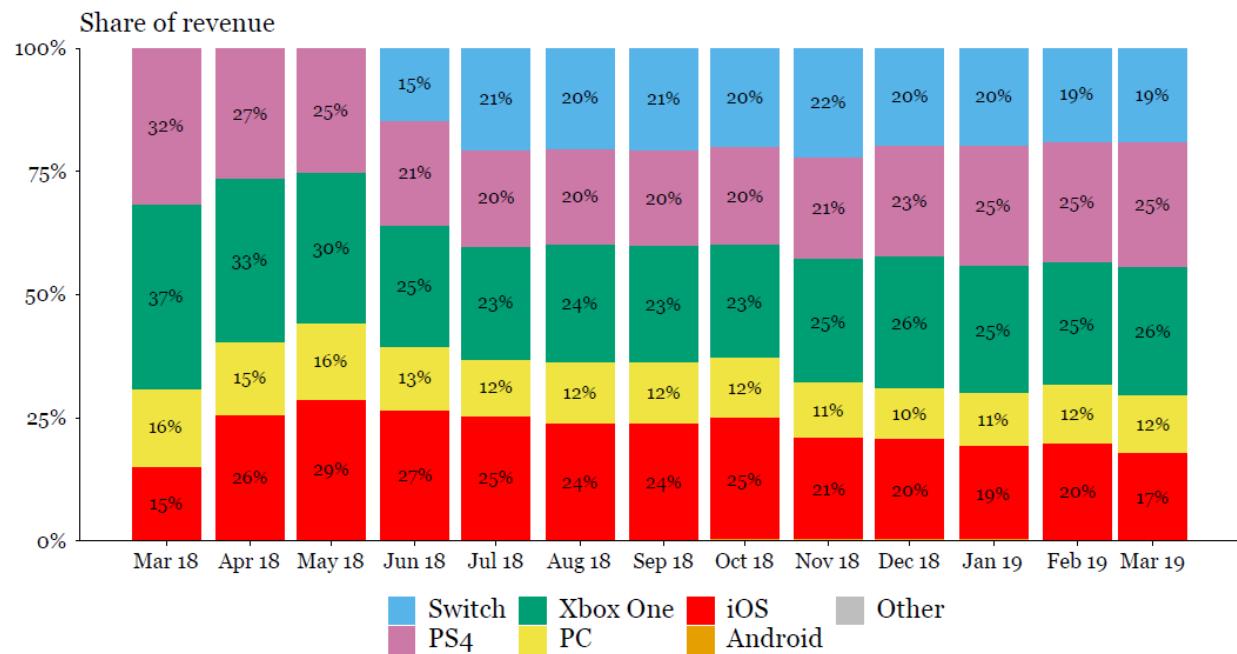
Figure 18
Worldwide Fortnite iOS revenue from user accounts that accessed Fortnite on an iOS device in June 2018 (March 2018 – March 2019)



Source: DX-4823 (summarizing DX-5339, Nintendo, “Fortnite”)

91. Because of the decline in spending on Fortnite across platforms during this time, it is also informative to look at whether the share of revenues shifted across platforms in June 2018 and later months for users who accessed the game on both an iOS device and the Fortnite Switch in June 2018. The trend in the share of spending across different platforms for these users, shown in Figure 19, particularly in the months immediately after June 2018, tells a consistent story that users substituted spending away from the App Store after Fortnite became available on the Nintendo Switch. The App Store’s share of spending by users who accessed the game on both iOS and the Nintendo Switch in June 2018 fell from 27% in June 2018 to 24% in August 2018. Over the same period, the share of Nintendo Switch increased from 15% to 20%. By March 2019, the App Store’s share fell to 17% and Nintendo Switch’s share was 19%.

Figure 19
Worldwide share of revenue from user accounts that accessed Fortnite both on iOS and on Nintendo Switch devices in June 2018 by platform (March 2018 – March 2019)



Source: DX-4771 (summarizing DX-5339)

92. Epic's user data similarly show that the App Store's share of total time played by users who accessed the game on both iOS and the Nintendo Switch in June 2018, fell from 23% to 9% from May 2018 to September 2018, while the Nintendo Switch's share of total time played rose to 31% by September 2018.¹²

93. Thus, empirical evidence following the introduction of Fortnite on Nintendo Switch, particularly immediately after the event, is consistent with consumers substituting between the two platforms.

iii. Analysis of Fortnite and the removal of Fortnite from the App Store after the Hotfix

94. Fortnite exemplifies the substitutability of game transactions across game transaction platforms. As already described, Fortnite users play Fortnite on several devices and make game transactions on different platforms. This is reflected in the Fortnite data, which show that from March 2018 to July 2020, the share of users that accessed Fortnite on a particular platform that also accessed Fortnite on at least one other platform (i.e., multi-homers) ranged from 32% to 54%. Between January and July 2020, iOS multi-homers accounted for over 85% of Fortnite revenue from iOS device users.

¹² DX-4770

95. V-bucks embody the substitutability of transactions for Fortnite across platforms. With limited exceptions, V-bucks purchases are fungible across devices, and V-bucks purchased on one transaction platform are the same as V-bucks purchased on another transaction platform.¹³ A consumer can purchase V-bucks all on one transaction platform, all on another transaction platform, or on both. However, combining together V-bucks purchased on multiple platforms does not result in something different or better (unlike when complementary products, like salt and pepper, are combined) compared to V-bucks purchased on only one transaction platform.

96. Epic and Epic's experts recognize this substitutability. Epic CEO Tim Sweeney has stated "that games come first, and that a great game will succeed wherever it's sold. It proves that developers have the real power in the industry, and that where developers go customers will go with them."¹⁴ An internal Epic presentation also found that when Epic introduced its Season 4 Battle Pass on May 1, 2018, Fortnite's revenue generated on PS4 experienced a sharp increase, while the share of revenue on iOS devices fell.¹⁵ And Dr. Evans states that he can assess how the removal of Fortnite from the App Store after the Hotfix can be used to determine whether users found substitutes.¹⁶

97. I analyzed data on all of Epic's Fortnite users following the Hotfix to see whether iOS Fortnite users switched their spending on Fortnite to non-iOS and non-Google platforms. Indeed, they did. My analysis shows that Epic retained the vast majority (81.1%–87.7%) of iOS Fortnite users' pre-Hotfix revenue (across all transaction platforms) in the four months post-Hotfix period (see Figure 20). The rate of revenue retention was

- 40.4%–50.7% for iOS single-homers, who in response to the change, began playing and spending money on new non-iOS, non-Google transaction platforms for the first time;
- 86.3%–93.7% for iOS multi-homers, who in response to the change, began spending more money on non-iOS, non-Google transaction platforms than they had previously.

Figure 20
July 2020 iOS user switching and retention, worldwide (September 2020 – December 2020)

	Jul/Sep	Jul/Oct	Jul/Nov	Jul/Dec
1. Percent of pre-“hotfix” total revenue retained across all “platforms” (all iOS users)	81.1%	84.9%	87.7%	86.2%
Increase in revenue on other “platforms” as a fraction of revenue lost on iOS				
2. All iOS users	22.4%	36.5%	51.4%	40.9%
3. iOS single-homers	26.5%	37.5%	30.6%	22.4%
4. iOS multi-homers	18.7%	35.3%	63.2%	49.4%

Source: DX-4824 (summarizing DX-5339)

¹³ Sony and Nintendo impose contractual terms which require V-bucks purchased through their platforms only to be used on their own consoles. Apple does not have any such restrictions.

¹⁴ DX-3199.002

¹⁵ DX-4133.009-012

¹⁶ Evans Direct Testimony, ¶ 127

98. Dr. Evans cannot disagree with the fact that consumers switched spending from the App Store to alternative transaction platforms. Despite his flawed approach to analyzing the Fortnite data after the Hotfix (which I explain in more detail below), Dr. Evans himself finds that iOS Fortnite users shifted a meaningful amount of Fortnite transactions to other game transaction platforms after the Hotfix, a finding which Dr. Evans characterizes as substitution. He even finds that iOS Fortnite users who had never previously made a Fortnite transaction on a non-iOS platform before the Hotfix substituted to other transaction platforms after the Hotfix.¹⁷

99. In fact, Epic publicly encouraged users to switch transaction platforms following Fortnite's removal from the App Store (Figure 21). My analyses of the Fortnite data show that effort was successful. Such an effort to switch consumers to alternative transaction platforms could only happen, however, because game transactions on these alternative platforms are substitutes for transactions on the App Store.

Figure 21
Epic's #FreeFortnite Cup press release



If you're left behind on iOS after the Chapter 2 - Season 4 launch, the party continues on PlayStation 4, Xbox One, Nintendo Switch, PC, Mac, GeForce Now, and through both the Epic Games App at epicgames.com and the [Samsung Galaxy Store](#). Join the fight against [@AppStore](#) on social with #FreeFortnite.

All of your friends. Awesome prizes. And one bad apple. We're droppin the #FreeFortnite Cup.

Source: DX-3724.002

¹⁷ Evans Direct Testimony, ¶ 129

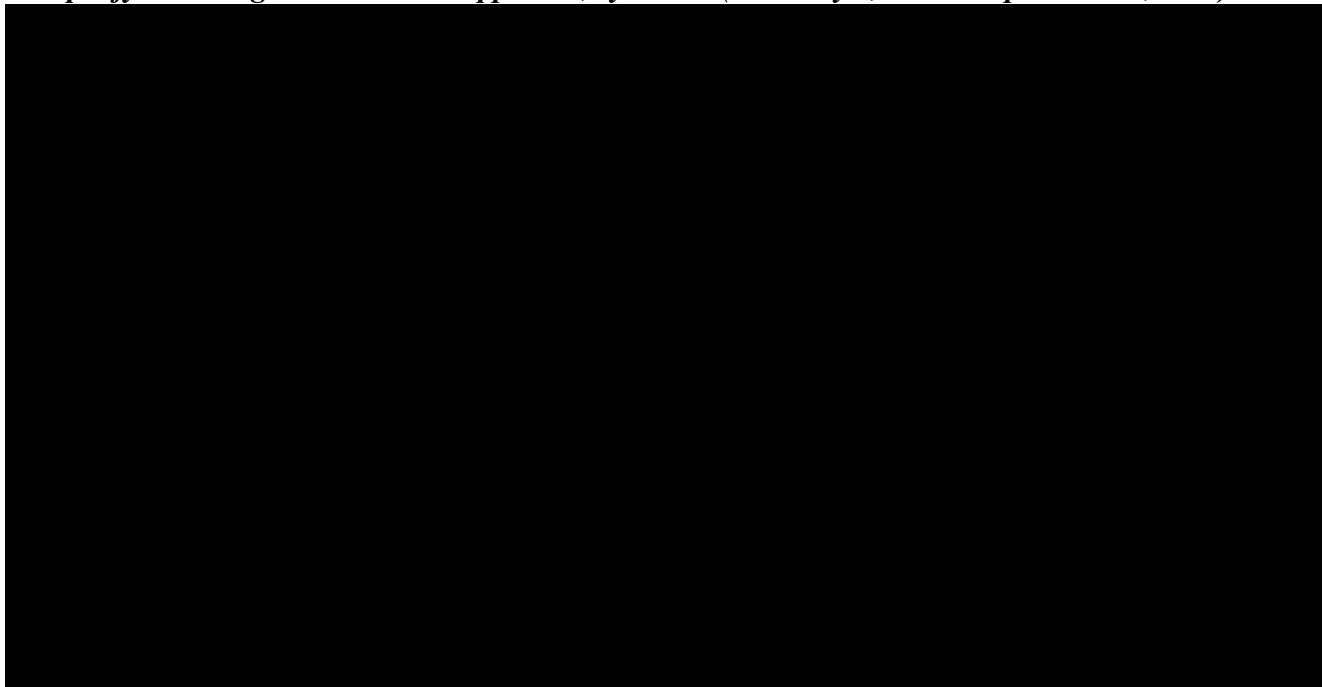
iv. Real-world examples of the ease of substitution for non-game apps

100. Evidence from two real-world examples for non-game apps tells a similar story that transactions on other transaction platforms are substitutes for transactions on the App Store.

101. When app developers allow consumers to make paid transactions outside the App Store for content accessible through iOS, those developers and consumers are substituting for paid transactions on the App Store. Some apps, called “reader apps,” are permitted to allow use of digital content purchased outside the app without making the same content available for purchase within the iOS app. One way to test the substitutability of other forms of payments for paid transactions on the App Store, then, is to assess what happens to revenue and downloads for reader apps from iOS users after developers stop monetizing through the App Store.

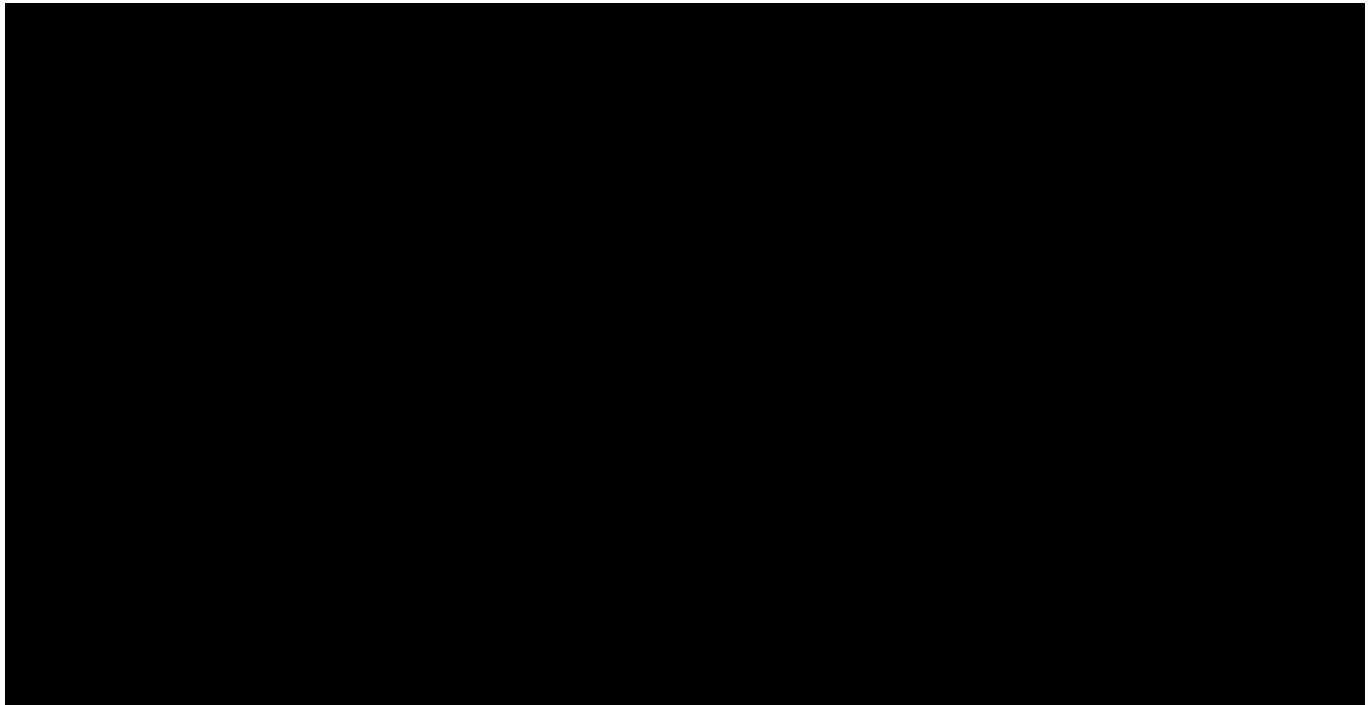
102. ***Spotify’s decision to stop offering subscriptions for in-app purchase on iOS.*** Spotify is one example of a reader app that highlights how transactions on the App Store are substitutes for transaction on other platforms. In May 2016, Spotify chose to remove paid transactions from the App Store, eliminating the possibility of new customers signing up for Spotify’s premium service through the iOS app. Even though iOS in-app purchase revenue fell over time (Figure 22), as expected, the Spotify user base in the United States continued to grow (Figure 23).

Figure 22
Spotify revenue generated in the App Store, by month (February 1, 2015 – September 30, 2019)



Source: DX-4793 (summarizing DX-5338; Dawn Chmielewski, “Apple says Spotify’s app already violates App Store rules,” *Vox*, Jul. 1, 2016)

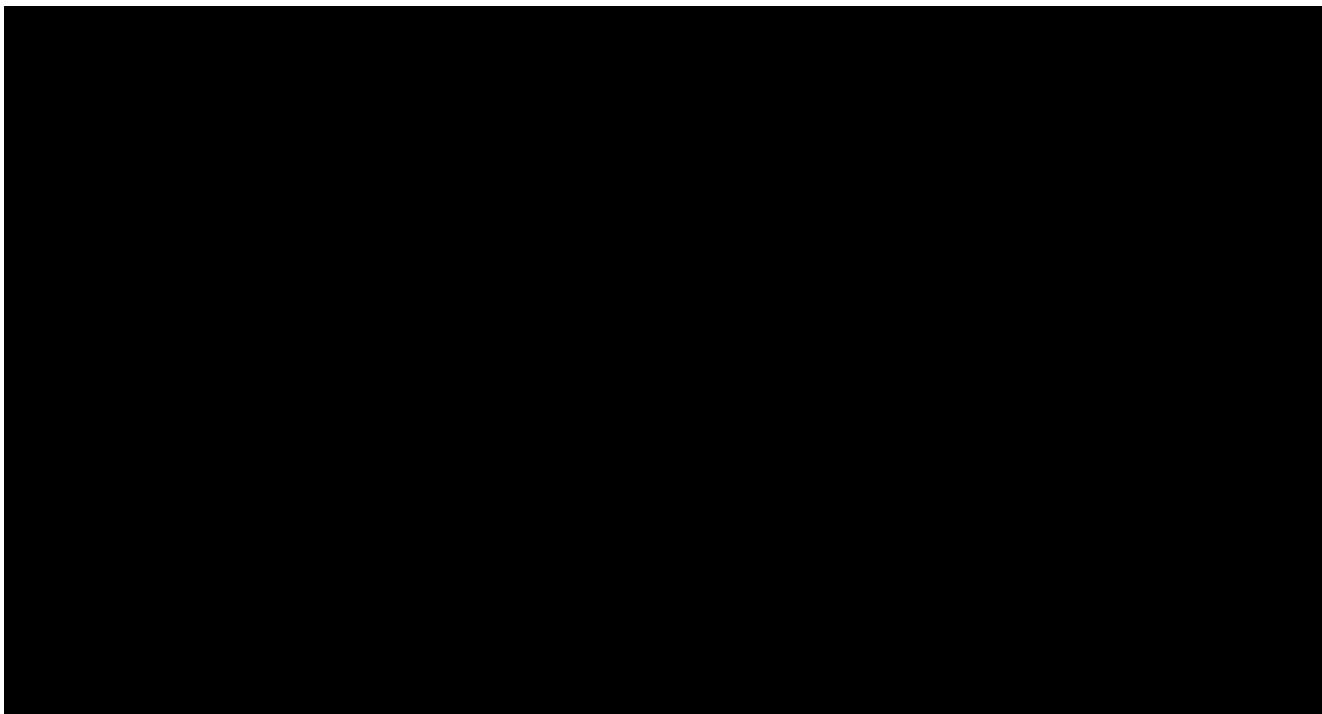
Figure 23
Spotify total US paid monthly active users, by month (February 1, 2015 – September 30, 2019)



Source: DX-4794 (summarizing DX-4641; Dawn Chmielewski, “Apple says Spotify’s app already violates App Store rules,” Vox, Jul 1, 2016)

103. This growth in users was not coupled with a decrease in the share of total Spotify active users or downloads on iOS. I show in Figure 24 that the number of monthly initial downloads of the Spotify app through the App Store did not decrease after Spotify’s shift to monetizing entirely outside the App Store using methods that do not generate commissions for Apple.

Figure 24
Spotify initial downloads in the App Store, by month (February 1, 2015 – September 30, 2019)

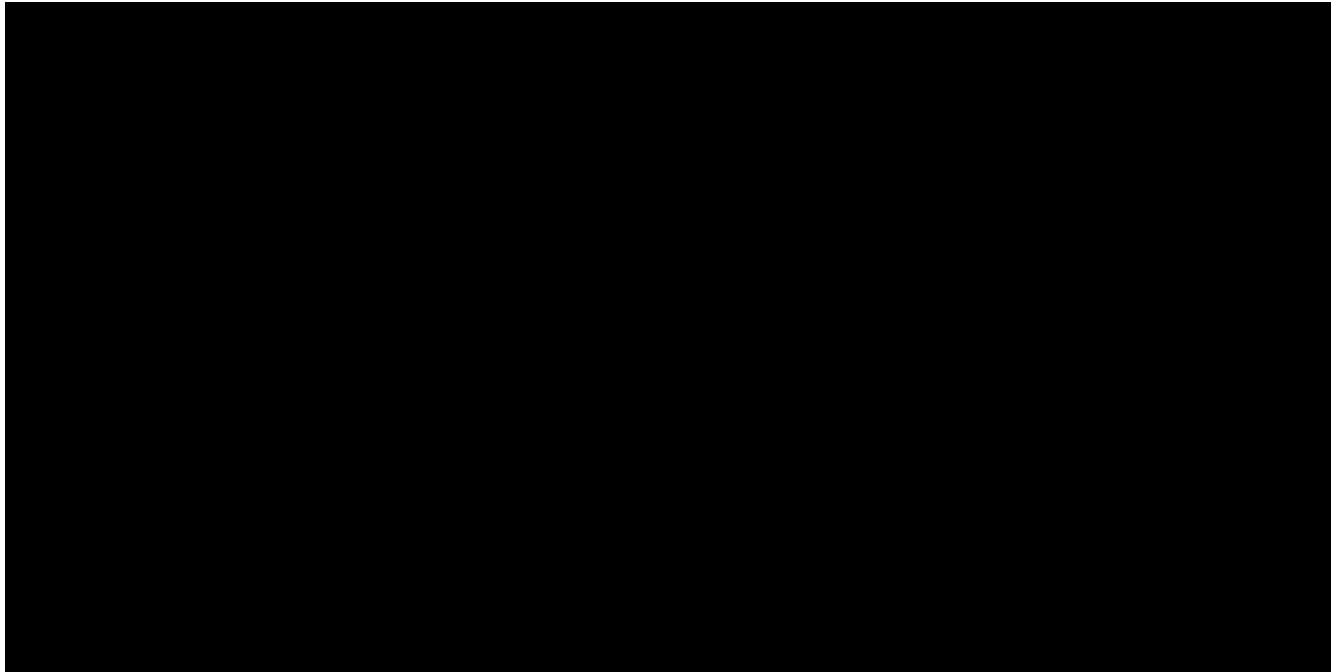


Source: DX-4795 (summarizing DX-5338; Dawn Chmielewski, “Apple says Spotify’s app already violates App Store rules,” Vox, Jul 1, 2016)

104. Using data provided by Spotify, I also show in Figure 25 that the share of Spotify listeners (both paid and free) attributable to iOS continued to grow, meaning that Spotify subscriptions successfully switched to monetizing outside of the App Store. The clear conclusion from this analysis is that transactions on the App Store are substitutes for transactions on other platforms and direct sales through Spotify’s website.

Figure 25

Spotify percent of total US monthly active users attributable to iOS (February 1, 2015 – September 30, 2019)



Source: DX-4796 (summarizing DX-4641; Dawn Chmielewski, “Apple says Spotify’s app already violates App Store rules,” Vox, Jul 1, 2016)

105. *Netflix’s decision to stop offering subscriptions for in-app purchase on iOS.* The results for Spotify are also consistent with the Netflix revenue and initial download numbers on iOS—each continued to grow meaningfully after Netflix stopped allowing users to purchase in-app subscriptions within the Netflix iOS app.¹⁸ Consumers therefore substituted transactions through the App Store for transactions on other transaction platforms as well as through the Netflix website.

106. These real-world examples provide consistent evidence that consumers do indeed substitute across transaction platforms, providing strong evidence that transactions on digital game transaction platforms are substitutes for transactions on the App Store.

107. Epic’s experts, however, ignore empirical evidence of real-world substitution between transaction platforms. Instead they claim that transaction platforms are complements, rather than substitutes, because consumers use transaction platforms in different situations. These opinions are non-economic and unreliable.

108. Epic’s experts have not provided any reliable economic evidence that game transaction platforms are complements. They also ignore that consumers substitute *across* games since consumers can choose to make a transaction for one game on a particular transaction platform

¹⁸ Netflix saw revenue increase from \$15.8 billion in 2018 to \$20.2 billion in 2019. See DX-4558.022

instead of a different game on either the same transaction platform or a different transaction platform.

109. For instance, I understand that one of Epic's experts, Dr. Cragg, has analyzed Fortnite users' play time across devices and comes to the unremarkable conclusion that Fortnite players who are motivated to play more tend to play on a greater number of devices (and vice versa). This would not be evidence that different devices are complements. And whatever this may show about complementarity in *use* of devices, such analysis would not imply that game *transactions* are complements. Even if Epic's experts showed that mobile and console devices are complements, this would still be entirely consistent with substitution in game transactions. In other words, users may be more likely to spend more time playing a game overall when they have more devices to play on, but also substitute in-game purchases across the many devices on which they play.

J. Industry participants recognize that the App Store competes with other game transaction platforms

110. I have also analyzed internal and public documents from industry participants, and these documents are consistent with my empirical analyses showing that developers and consumers substitute between game transaction platforms. All of these documents show that game transaction platforms compete with the App Store.

111. I have reviewed several documents which show that Apple views game transaction platforms on many types of devices, including platforms on consoles, PCs, and mobile devices, as competitors to the App Store. For instance, an October 2009 email to Apple's vice president of Worldwide Developer Relations, Ron Okamoto, discussed the competitive pressures from Sony's PSP Go (Figure 26). Apple also summarized a competitive analysis of the Amazon Appstore in March 2011 email, identifying the competitive threat as "very high."¹⁹ Further, in 2018, Apple employees tracked Google's launch of its Subscription Center and its possible impact on the App Store.²⁰ A 2018 internal Apple presentation also calculated Apple's market share as a total of all game transactions, including game transaction platforms on console, PC, and mobile, reflecting how Apple considers these other game transaction platforms to be competitors to the App Store (Figure 27).

¹⁹ DX-4447

²⁰ DX-4131

Figure 26
Internal Apple email regarding App Store competition with the PSP Go

From: Graeme Devine <graeme@apple.com>
Date: October 2, 2009 9:36:03 AM PDT
To: meriko borogove <shock@apple.com>, John Stauffer <stauffer@apple.com>, Scott Forstall <forstall@apple.com>, Isabel Mahe <isabel@apple.com>, Ron Okamoto <rokamoto@apple.com>, Greg Joswiak <joz@apple.com>
Subject: PSP Go Launch

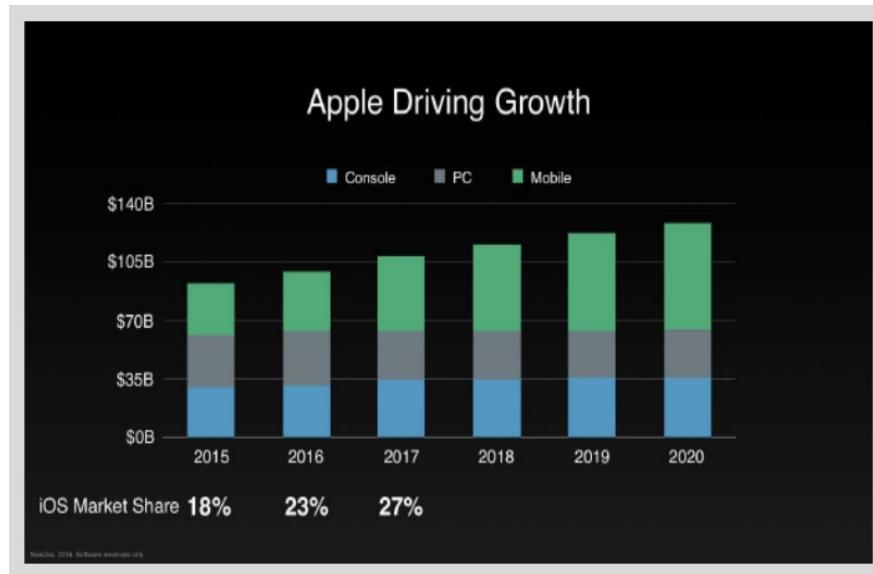
Meriko asked me to pass this writeup along.

The PSP Go launched yesterday. It's a key competitor to the iPhone/touch because Sony also relaunched the PSN Store (PSN = PlayStation Network) with digital game downloads and only way you can get content onto the PSP Go is through the store.

- Sony is positioning itself against the App Store by highlighting their catalog as high quality.
- Sony is appealing to developers who perceive Apple's App Store approval process to be frustrating (I think Sony points this out more than there are actual developers)
- Overall I think Sony is definitely responding to Apple's gaming push.

Source: DX-4389

Figure 27
Internal Apple presentation showing the App Store competing with game transaction platforms for mobile, PC, and console



Source: DX-4178.008

112. Operators of these other game transaction platforms also view the App Store as a competitor for game transactions. For example, I have reviewed internal documents from Google

that show that it views other game transaction platforms as competitors to Google Play. One such document notes how competing game transaction platforms, including the App Store, have invested in gaming to grow their business (see Figure 28). A 2011 presentation from Microsoft likewise listed several competitors in the game transaction market, including the App Store (called the iTunes Store in the presentation) and transaction platforms on consoles (see Figure 29).

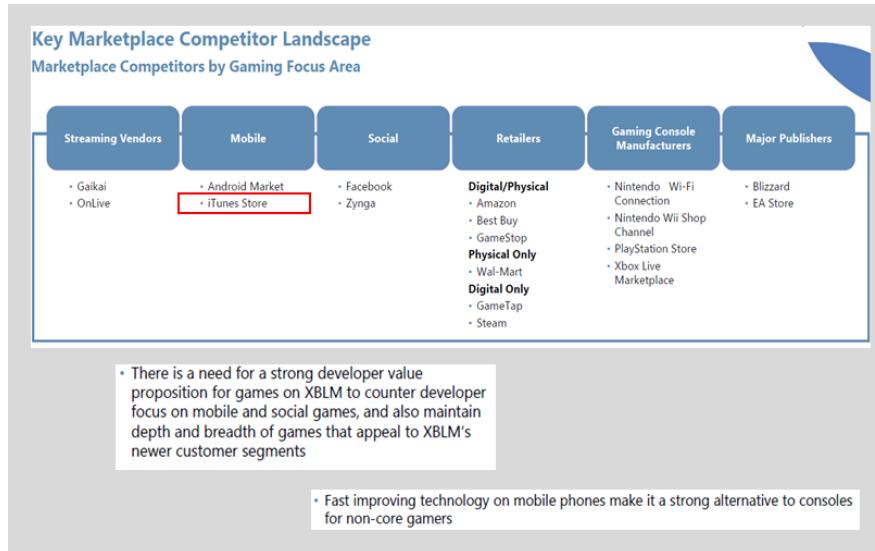
Figure 28

Internal Google presentation comparing Google to competing game transaction platforms



Source: DX-5326.030

Figure 29
Microsoft presentation listing game transaction platforms and other game retailers



Source: DX-5363

113. Operators of other game transaction platforms also have described in public statements that they compete with the App Store.²¹ Epic documents and deposition testimony further highlight that gaming devices and game transaction platforms compete with each other.²²

114. That game transaction platforms, including the App Store, compete with each other is also clear from the restrictions that some platforms place on developers like Epic. Analysis of Epic's agreements with its console partners Nintendo, Sony, and Microsoft indicates that these companies see the App Store—along with other PC and mobile transaction platforms—as competitors to transaction platforms on their console devices.²³ Revealingly, these companies restrict the products and services Epic may offer on mobile platforms and the prices it may charge for them. For instance:

- [REDACTED]
- [REDACTED]

²¹ Microsoft Corporation, SEC Form 10-K for period ended June 30, 2020, filed on July 30, 2020, p. 12; Alphabet Inc., SEC Form 10-K for period ended December 31, 2020, February 2, 2021, p. 7

²² For example, DX-3867 and DX-3732.003

²³ DX-4425; DX-3582.003; DX-3437; Deposition of Joe Kreiner (Epic), February 5, 2021, pp. 35–36, 52, 80, 82–83, 88–89, 91–93.

- Both Sony and Microsoft have rules about when developers have to release games on their platforms if the developer also releases the game on another platform, which aims to ensure that the set of games on Sony and Microsoft's platforms are competitive with the games on other platforms.
- Sony recognizes that consumers could switch to other game transaction platforms, including the App Store, to purchase V-bucks. To make up for lost revenue when consumers substitute to other platforms, Sony requires Epic to pay a “commission” on V-bucks purchased on other platforms.

115. Epic’s console platform partners would not need to impose these restrictions on Epic if they did not fear consumers would conduct game transactions on other platforms and thereby deprive them of revenue. That these companies thought it necessary to restrict potential competition between their own transaction platforms and the App Store is strong evidence that such competition exists.

K. Game transactions are in a unique market and should not be clustered with transactions for non-game apps

116. All of the evidence I have discussed so far clearly shows that the relevant antitrust market to assess the impact of Apple’s policies, pricing, and innovations is the market for digital game transactions. Dr. Evans, on other hand, would like to cluster together all apps—combining together game and non-game apps—into a single alleged market for “iOS app distribution services.”²⁴ I disagree with this approach.

117. Why is combining game and non-game apps wrong? First, game apps—which represented 62.9% [REDACTED] of all revenues through the App Store in 2018—are not substitutes for non-game apps. A transaction for a game app is not a substitute for a transaction involving a dating app. Transaction platforms and devices available for game apps also differ from the transaction platforms and devices available for non-game apps. This means that the substitutes to the App Store for all app transactions are not the same as the substitutes to the App Store for game transactions. In fact, some devices, such as consoles, are specifically designed for games and not for other types of apps.

118. In addition, Apple’s policies and practices are not the same for all types of apps. For example, “reader” apps like magazine, newspaper, book, audio, music, and video apps do not require developers to offer consumers the ability to purchase a subscription in-app at all. All other apps, including games, must offer consumers the option of purchasing digital content within the app if the content can also be purchased outside of the app.

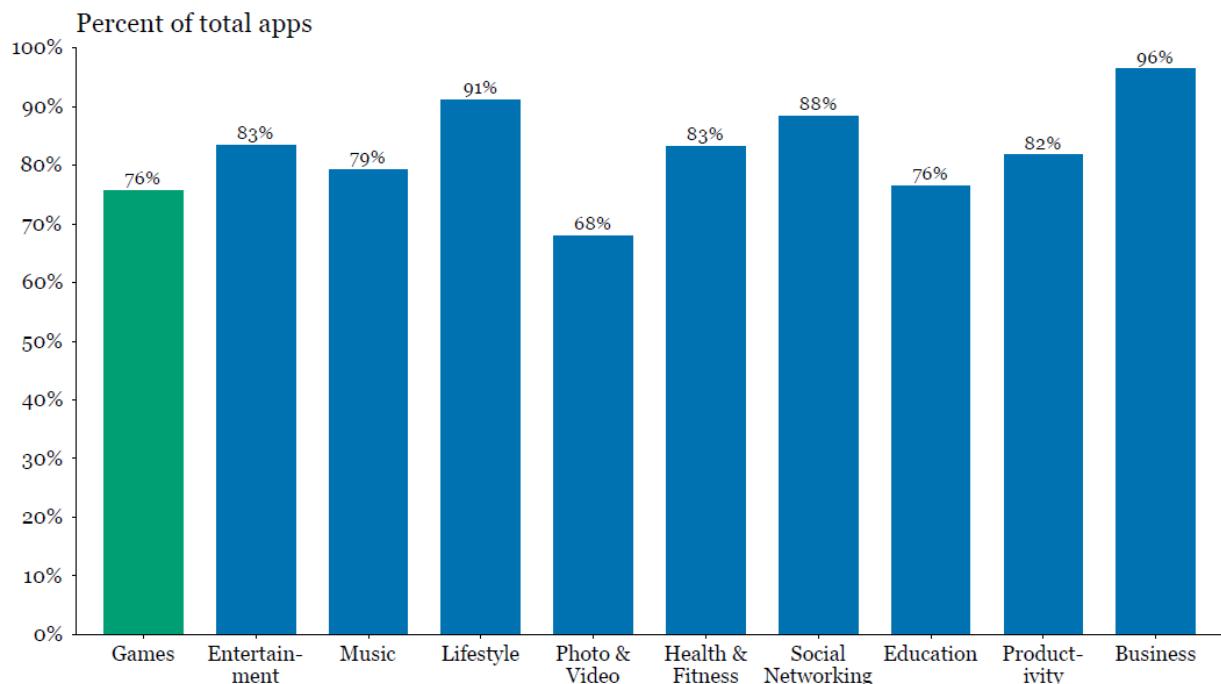
119. If Dr. Evans wanted to determine whether all apps could be clustered into a single market, he would need to analyze all apps transacted through the App Store and show that the competitive conditions are the same across app categories. He has not done this. In fact, the evidence shows that clustering all apps into a single market is wrong.

²⁴ Evans Direct Testimony, ¶39

120. My analyses show significant variation in the typical business models and monetization strategies for game apps relative to other apps. This variation reflects differences in competitive conditions between game apps and other apps.

121. For example, I show in Figure 30 the proportion of apps by app genre in the App Store that were free-to-download and did not have in-app purchases in FY2019. I looked at the proportion of apps by app genre that did not monetize through the App Store or pay a commission to Apple. While most apps in FY2019 (over 80%) do not monetize through the App Store, game apps are more likely to monetize through the App Store compared to most non-game apps. Developers of game apps therefore differ from developers of non-game apps in their ability and willingness to monetize through other methods (such as the sale of physical goods, in-app advertising, or payment outside of the app) that avoid paying a commission to Apple.

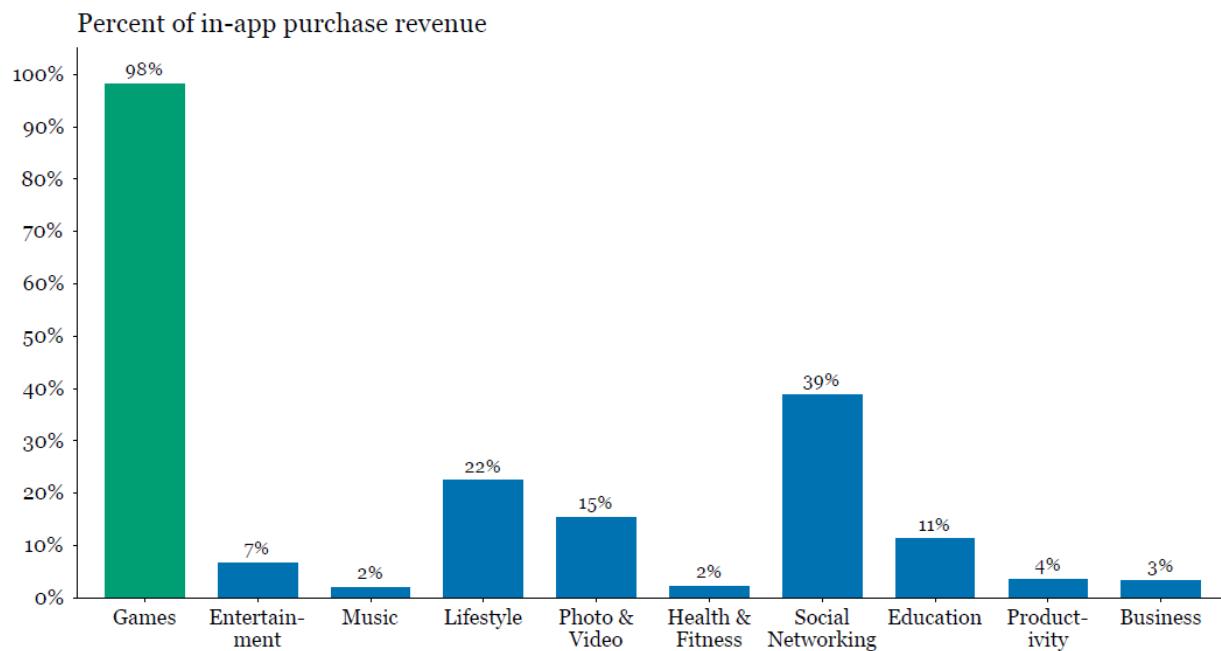
Figure 30
Percent of apps that are free-to-download without in-app purchases by genre (October 1, 2018 – September 30, 2019)



Source: DX-4780 (summarizing DX-5338)

122. The contrast between game and non-game apps is also apparent by looking at how much revenue from in-app purchases comes from subscriptions versus non-subscriptions by app genre. The results in Figure 31 are striking. Nearly all in-app revenue—98%—for game apps came from non-subscription in-app purchases. The overwhelming majority of in-app revenue for non-game apps, on the other hand, is from subscription in-app purchases. Ultimately, game apps differ dramatically from other apps in how they generate in-app revenue, and combining game and non-game apps into a single market would ignore these differences in how game and non-game app monetize.

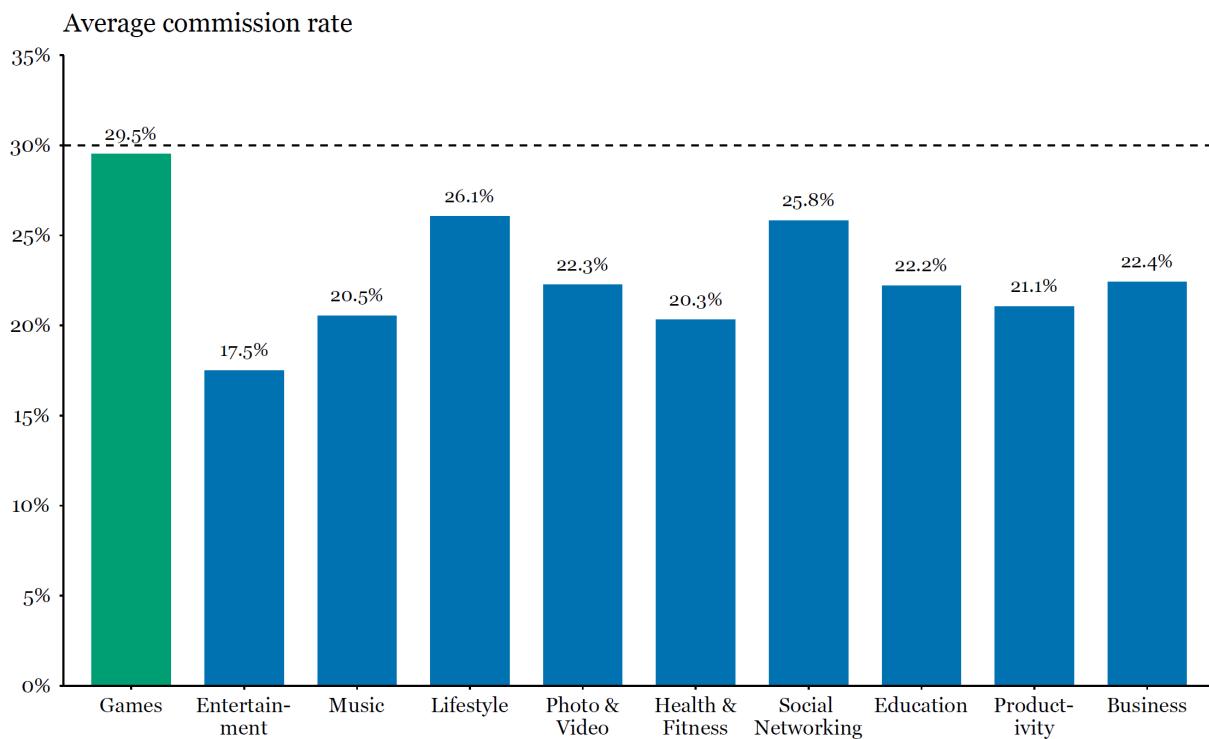
Figure 31
*Percent of App Store in-app purchase revenue from non-subscription in-app purchases by genre
(October 1, 2018 – September 30, 2019)*



Source: DX-4782 (summarizing DX-5338)

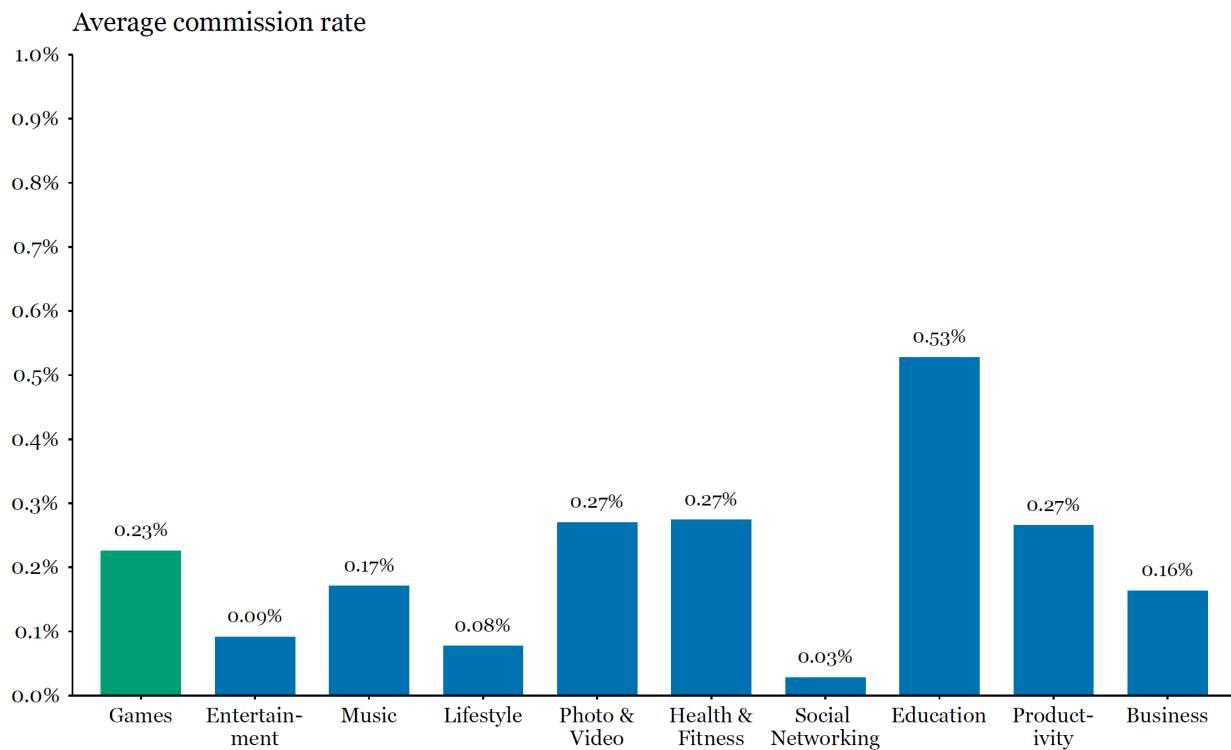
123. The average commission rate paid by developers by app genre highlights the differences in competitive conditions between transactions for game and non-game apps. I show in Figure 32 and Figure 33 the average commission rate paid by developers for in-app purchases and initial downloads, respectively, by app genre. These average commission rates reflect how developers monetize, such as whether developers offer free-to-download apps or whether they offer subscription or non-subscription in-app purchases. The figures show meaningful variation in average commission rates across app genres, highlighting differences in competitive conditions and market outcomes between games and non-game apps.

Figure 32
Average in-app purchase commission rate by genre (October 1, 2018 – September 30, 2019)



Source: DX-4786 (summarizing DX-5338)

Figure 33
Average initial download commission rate by genre (October 1, 2018 – September 30, 2019)



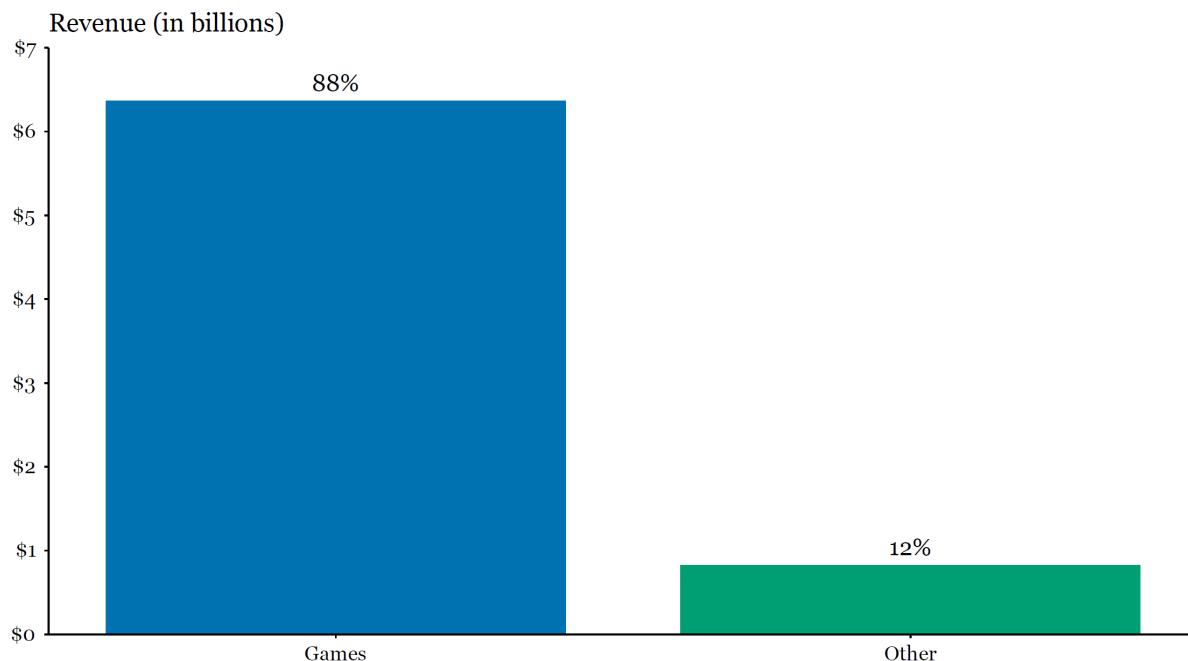
Source: DX-4787 (summarizing DX-5338)

124. I also observed considerable variation in the average transaction price between app genres, and, in particular, between game apps and other apps. The average transaction price for game apps is \$9.65, while the averages for other app genres range between \$7.11 for photo and video apps and \$14.10 for health and fitness apps. The average download price also differs substantially.

125. To determine whether it is appropriate to consider game app transactions as in the same relevant market as non-game app transactions, I also considered whether game app transactions are engaged in by distinct populations of developers. I found that developers that engage in digital game transactions are not the same as the developers that engage in transactions for non-game apps. Game developers (such as Epic) typically specialize in game development, not the development of apps in general. Figure 34 shows that the share of game developers' App Store revenue from game apps is 88.2% but is only 11.8% for non-game apps. This analysis makes clear that game developers tend to focus on game apps, not other apps.

Figure 34

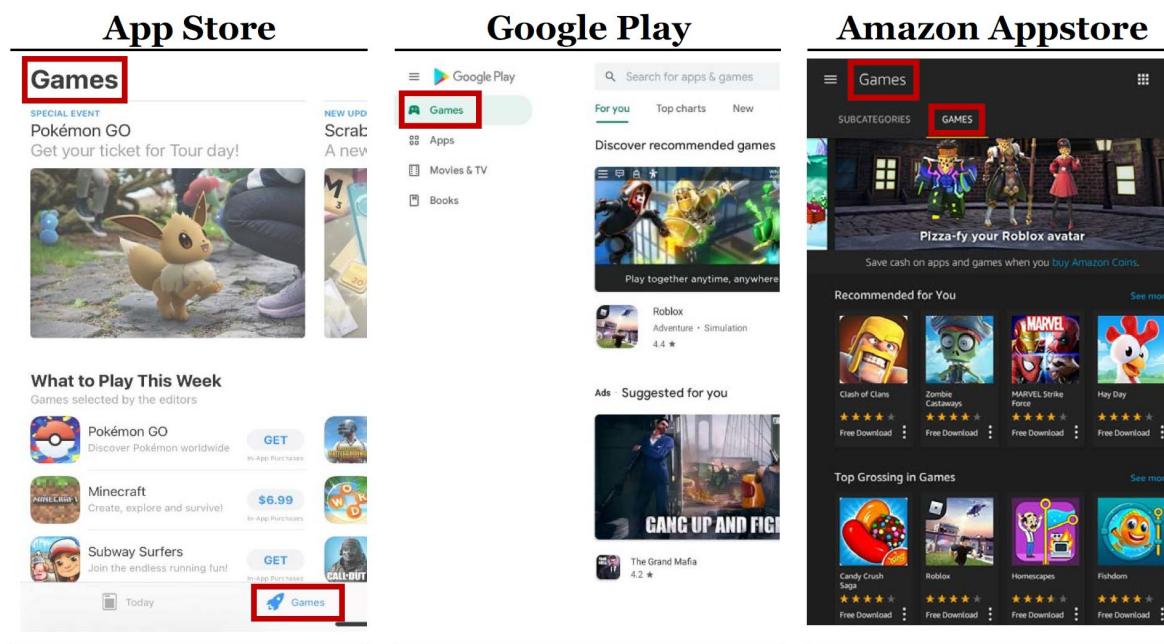
App Store revenue earned by game developers (October 1, 2018 – September 30, 2019)



Source: DX-4773 (summarizing DX-5338)

126. Looking at industry practices also shows how game transactions and non-game transactions are in distinct markets. I show in Figure 35 that consumers browse games through a distinct “games” tab in the App Store Google Play and the Amazon Appstore also separate games from non-game apps in their storefronts.

Figure 35
Games category in transaction platforms on mobile devices



Source: DX-4774

127. Apple's organizational structure also reflects how Apple separates game and non-game apps: Apple employs two separate heads of App Store business development, one for games and one for all other non-gaming app. Apple's behavior is thus consistent with my view that game transactions are a distinct market from non-game app transactions.

128. These industry practices, along with my empirical analyses showing differences in monetization and outcomes across app genres, make clear that game apps are in a separate market from non-game apps. It is therefore incorrect to cluster many potential separate markets for apps into a single market that encompasses all apps.

129. All of the evidence I have presented shows that the relevant product market in this matter is the market for digital game transactions. This market includes all platforms on which developers and consumers can conduct digital game transactions, and it should not be limited to just transactions on iOS. The relevant product market in this matter must also focus on game transactions and should not cluster together multiple potential markets for transactions of different types of apps.

IV. Market power: Apple lacks monopoly power for digital game transactions

130. I turn now to the question of whether Apple possesses monopoly or market power in the relevant market. Economists define market power as the “ability of firms to raise price[s] above the competitive level for a sustained period.”²⁵ A firm can also be said to have market power if it can profitably restrict output. Firms are sometimes said to have “monopoly power” when possessing a high degree of market power.

131. Epic and Dr. Evans’ claim that Apple possesses monopoly power is premised on an incorrect definition of the relevant product market—iOS app distribution. As I’ve already shown, the proper relevant market in which to assess the effects of Apple’s conduct on competition is the market for digital game transactions. This market is demonstrably broader than the App Store, including a variety of competing game transaction platforms.

132. Professor Lafontaine explains that, to assess whether a firm possesses market power in a relevant market, economists evaluate both structural factors such as market shares, market concentration, and ease of entry, as well as market outcomes such as price, output, quality, and innovation.

133. I have conducted quantitative and qualitative analyses of both the structure of the market for digital game transactions as well as available evidence on price, output, and innovation, and have reached the opinion that Apple does not possess market power in the two-sided market for digital game transactions:

- First, the structure of this market is inconsistent with Apple possessing substantial market power. Apple has only a small share—between 23.3% and 37.5%—and the constant influx of new, innovative competitors shows that entry barriers are low. Market participants are constrained by competition from other businesses, such as direct distribution of games.
- Second, economic evidence on key market outcomes—namely price, output, and quality—demonstrates that Apple lacks market power in the digital game transactions market. Commissions charged by Apple and other participants have fallen while output has consistently increased. Innovation has been continuous.

134. To assess Epic’s claim that Apple possesses monopoly power, I conducted additional analyses assuming for the sake of argument that Dr. Evans is correct and the market is limited to iOS app transactions. Even then, I conclude that Apple is constrained by many factors from raising prices above competitive levels. These include the ability of developers to adopt business models that do not require paying a commission to Apple (such as in-app advertising or selling subscriptions and other content outside of the iOS app) and competitive pressure from Android mobile devices. Moreover, the evidence regarding price and output is the opposite of what one would expect to see in a monopolized market—just as with game transactions, prices for all iOS app transactions have not risen and output has exploded.

²⁵ Jonathan B. Baker and Timothy F. Bresnahan, “Economic Evidence in Antitrust: Defining Markets and Measuring Market Power,” in *Handbook of Antitrust Economics*, ed. Paolo Buccirossi, (Cambridge, MA:MIT Press, 2008), p. 15

135. My analyses to support these opinions follows.

A. The structure of the market for digital game transactions is inconsistent with Apple possessing market power

i. Apple's market share of game transactions is inconsistent with market power

136. I begin my analysis of market power by looking at the structure of the market for digital game transactions. The first piece of evidence regarding market structure is Apple's share of the digital game transactions market. I find that Apple's share in this market is inconsistent with market power.

137. As Professor Schmalensee explains, in a two-sided transaction market such as the game transaction market there are multiple measures of output that could be used to calculate market shares. One such measure is the total number of game transactions; however, this measure would treat each transaction equally, regardless of price or value. Data on the total number of game transactions is also not available market-wide. So I instead look at the dollar value of game transactions to estimate market share, as recommended by Professor Schmalensee.

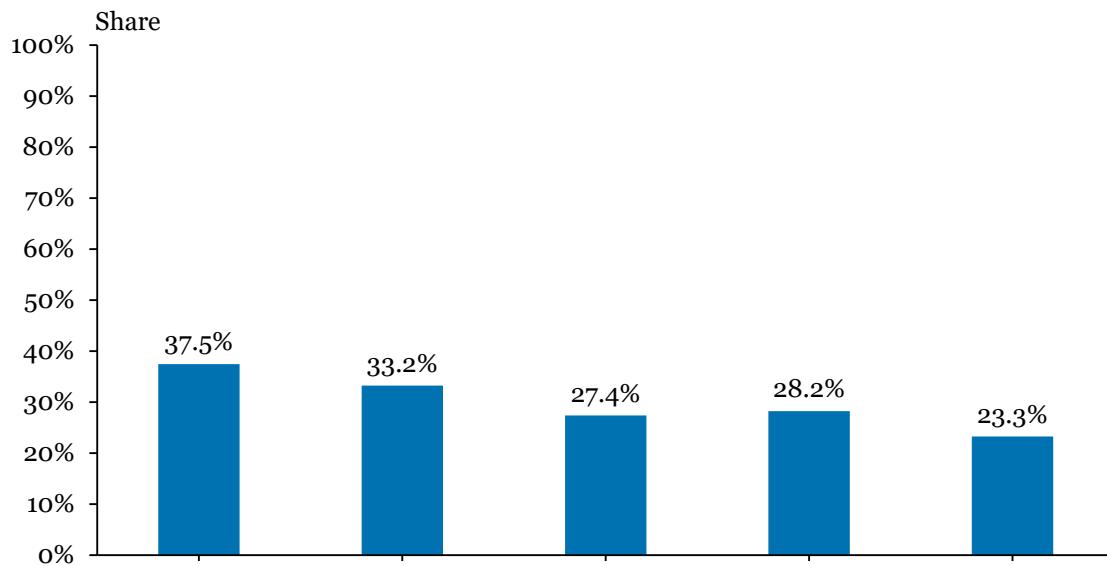
138. To calculate Apple's share of the market for digital game transactions in the U.S., I measured the dollar value of game transactions using consumer spending on games across platforms. I computed the total game revenue on the App Store from the Apple transaction data, and I use 2018, the most recent complete year of data available to me. I use two third-party data providers to estimate the total market size: Newzoo and the Entertainment Software Association, or ESA.²⁶

139. Since the third-party data include different measures of consumer spending in their estimates, I performed several sensitivities which included different sets of consumer spending in the total market size. On the one end, I take a very conservative approach in which I only consider spending that is definitely within the boundaries of the market. For other estimates I include other measures of consumer spending.

140. Across all of these sensitivities, I find that Apple's market share in 2018 (the most recent complete year of data) lies between 23.3% (including subscriptions and boxed games as part of the overall market) and 37.5% (limiting the market to digital game transactions only). These results are reflected in Figure 36.

²⁶ DX-3248, DX-4217.020

Figure 36
Apple share of US digital game transactions market (2018)



Data Source Revenue Included	Newzoo	Newzoo	Newzoo	ESA/NPD	ESA/NPD
Digital Transactions	✓	✓	✓	✓	✓
Subscriptions		✓	✓	✓	✓
Boxed Games			✓		✓

Source: DX-4797 (summarizing DX-5338, DX-3248, DX-3814, DX-4217)

141. Using a conservative definition of the market for digital game transactions, which likely overstates the correct figure, I estimate Apple's share of the relevant market to be 37.5%. As Dr. Evans acknowledges, other forms of distribution, including single-sided distributors, serve as competitive constraints and should be included in the market. Accounting for these other methods gives Apple a share of 23.3% or 27.4% of game transaction revenues, depending on the data source. These estimated shares are inconsistent with Apple having substantial market power.

ii. Entry of new game transaction platforms is inconsistent with market power, as at least seven new game transaction platforms have entered since the launch of the App Store and new technologies provide additional ways for consumers to play and pay for games

142. Many new digital game transactions platforms that compete with the App Store have entered the market since its launch, including Google Play, Samsung Galaxy Store, Windows Phone Store, Nintendo eShop, Amazon Appstore, EA's Origin, and the Epic Games Store. The entry of these competing game transaction platforms limits Apple's market power and is evidence that potential barriers to entry have not excluded new entrants from the market.

143. A number of game streaming services have also launched recently. These services allow consumers to play games on a large array of devices—including through a web browser. Regardless of whether these services are defined as game transaction platforms, they serve as a growing competitive constraint on the App Store.

144. Game streaming services offer consumers an alternative to downloading a game (either free or paid) through the App Store. While Professor Athey asserts that these services are not available through the App Store, she ignores that several game streaming services, including NVIDIA GeForce Now, Amazon's Luna, Google Stadia, and Microsoft xCloud are currently available on iOS through web streaming, providing users another way to play games on an iOS device.²⁷ Owners of iOS devices will soon even have the ability to play Fortnite on their iOS web browser through NVIDIA GeForce Now.

145. In addition, some game streaming services provide consumers the ability to purchase additional gaming content. For example, Google Stadia and Microsoft xCloud allow in-game purchases.²⁸ I also understand that NVIDIA GeForce Now runs the regular PC version of certain games (such as those on the Steam platform) from servers under NVIDIA's control, allowing for a standard in-game purchasing experience if the developer so chooses. These in-game purchases are similar to in-app purchases on the App Store and other game transaction platforms. This ability to make in-game purchases constrains Apple from exercising market power.

146. These services continue to grow. NVIDIA GeForce NOW plans to double in size in 2021. Newly available iOS-compatible game controllers allow consumers to more easily play game streaming services on mobile devices. Microsoft plans to introduce a web browser to their Xbox devices that can stream Google Stadia games. Microsoft has also reportedly started testing doubling the resolution of its xCloud streaming service, reaching parity with Google Stadia.

147. While some game streaming services, like Google Stadia, appear to provide game transactions between developers and consumers, all of the game streaming services I surveyed provide an alternative to transactions provided by game transaction platforms. Dr. Evans acknowledges that one-sided distribution methods can constrain two-sided platforms, and as these new services expand, they will further constrain Apple's ability to exercise market power. Internal documents show that both Apple and Google view existing and nascent streaming services as competitive threats. For instance, Google executives identified xCloud and NVIDIA GeForce Now as emerging competitors to Google Play as "more platforms emerge as substitutes" because of "flexibility to play on mobile/desktop/console devices."²⁹

148. According to Mark Rein, a Vice President at Epic, Epic is in negotiations to add Fortnite to Amazon's game streaming service. Epic has also engaged with Walmart on their plans to launch a game streaming service called "Project Storm." When Mr. Rein tested Walmart's prototype product on an Android phone, he thought the game playing experience was similar to playing on

²⁷ Athey Direct Testimony, ¶ 85

²⁸ DX-3762; DX-3080

²⁹ DX-4303.069-070; *see also* APL-APPSTORE_09899968, APL-APPSTORE_09899976

a console or PC, stating that “the graphics were very high resolution and all the – the details were PC-like and felt like being on a more powerful platform than a mobile platform.”³⁰

149. Overall, the entry, growth, and development of game streaming services indicate low barriers to entry, and such services provide an existing and increasing competitive constraint on the App Store.

iii. Apple faces competition from other forms of game distribution such as direct distribution by developers and traditional retail

150. It is not just competing digital game transaction platforms that limit Apple from having market power. Apple is also constrained from exercising market power by alternative forms of game distribution, including the direct distribution of games by developers (including through web browsers available to all iOS users) and distribution through traditional retail channels.

151. **Direct sales by developers within iOS and on different devices.** Developers have the option to forgo transacting through a game transaction platform by offering game apps and in-app content directly to consumers through their websites. For example, Epic provides Fortnite directly to consumers from its website for use on Android devices and through the Epic Games Store for PCs, Microsoft tablets, and Macs.

152. Additionally, and separately, Epic and other developers offer paid transactions on their websites for in-game content, such as V-bucks, that can be accessed and utilized on iOS. Thus, even though Apple does not allow game apps to be downloaded through an iOS web browser, it is still constrained by that fact that consumers can make purchases from developers through an iOS web browser.

153. Other game developers, such as the developers of Roblox, similarly provide games and in-game content directly to consumers in addition to transacting through game transaction platforms.³¹ From an economic standpoint, these direct downloads and direct sales of in-game content compete with digital game transaction platforms as well and further constrain Apple from obtaining or exercising market power in the market for digital game transactions.

154. **Traditional retail channels.** Apple is also constrained by the sale of games through traditional retail channels. These retail sales include sales of games on physical disks (often called boxed products) or sales of download codes inside a box.

155. For example, Epic distributed Fortnite: Save the World as a boxed product for consoles through traditional retail channels. Epic has also distributed boxed content containing redeemable codes for V-bucks and in-game items through retailers.³²

³⁰ Deposition of Mark Rein, February 10, 2021, pp. 107–108

³¹ DX-3755; DX-4473; DX-3748; DX-4552 ; DX-4292; DX-3262; DX-4390

³² Epic Games, Inc.’s Responses and Objections to Apple Inc.’s Second Set of Interrogatories, at 11–12 (Jan. 29, 2021)

156. Physical format games remain a meaningful proportion of total game sales: one estimate from 2018 by ESA/NPD found that 17% of all video games were physical format sales.³³ These physical format games sales would further constrain Apple from obtaining or exercising market power in the market for game transactions.

157. The evidence demonstrates that the structure of the digital game transaction market is inconsistent with Apple possessing substantial market power. Apple has only a small share of the market, emergence of new competitors shows that barriers to entry are low, and other methods of game distribution constrain Apple from exercising market power.

B. Analysis of market outcomes show that Apple has not increased prices for game transactions, quantity has risen, and quality has improved over time

158. Using the framework described by Professor Lafontaine and Professor Schmalensee, I next analyze market outcomes—such as price, quantity, and quality—to determine whether Apple has market power in the digital game transactions market. The evidence I analyzed does not support a finding that Apple has market power in this market.

i. Evidence shows that Apple has not exercised market power to increase commission rates or prices

159. Apple charges a commission on game transactions through the App Store that generate revenue for the developer. When Apple first launched the App Store, it set a commission rate of 30% on all such transactions. While the 30% commission rate remains for many game transactions on the App Store, Apple has lowered it to 15% for certain types of transactions. Through its history, Apple has never raised the commission for game transactions (or any transactions) performed on the App Store. The 30% commission was set before Apple could have conceivably had market power, even according to Dr. Evans.

160. Apple's commission rates for game transactions on the App Store are competitive with other platforms offering game transactions. The App Store's typical 30% commission rate on game transactions is common among not only a variety of game transaction platforms but also digital content providers more broadly.

161. When the App Store launched, Apple's 30% commission rate was the same as rates that developers were paying to other digital game transaction platforms at the time. In fact, Apple's 30% commission rate provided developers and publishers with a larger share of revenue than they typically earned from sales at traditional retailers like GameStop, Amazon, or BestBuy. From these traditional retailers, developers and publishers typically received only 45% of sales revenues, much smaller than the 70% share they receive from the App Store.³⁴

162. To evaluate how Apple's commission model compares to other game transaction platforms, I identified the largest digital game transaction platforms and determined the standard

³³ DX-4217.020

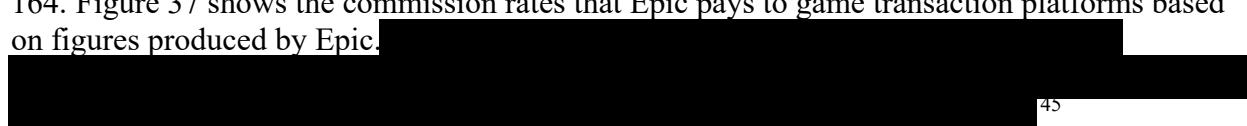
³⁴ DX-3120.011

commission rate (i.e., not accounting for any lowered commission rates for certain types of transactions or individually negotiated commission rates, if any) for each.

- Google charges a 30% commission on game transactions provided by Google Play.³⁵
- Amazon charges a 30% commission on game transactions provided by the Amazon Appstore.³⁶
- Samsung charges a 30% commission on game transactions provided by the Samsung Galaxy Store.³⁷
- Microsoft charges a 30% commission on game transactions provided by the Microsoft Store.³⁸
- Sony charges a 30% commission on game transactions provided by the PlayStation Store.³⁹
- Nintendo charges a 30% commission on game transactions provided by Nintendo, including the Nintendo eShop.⁴⁰
- Valve charges a 30% commission on game transactions provided by Steam.⁴¹

163. Epic's own contracts with different game transaction platforms demonstrate how Apple's commission rates are competitive with these other platforms. Epic agreed to pay a 30% commission rate on all Fortnite transactions via the Microsoft Store, PlayStation Store, Nintendo eShop, and Google Play.⁴² Epic also agreed to pay a 30% commission rate on all Fortnite transactions via the PlayStation Store; however, it further agreed to make additional payments to Sony on top of this 30% commission based on the amount of time that PlayStation users play Fortnite cross-platform—in other words, Epic actually pays Sony a commission rate greater than 30%.⁴³ The 30% commission is not specific to Fortnite: Epic pays a 30% commission rate for transactions involving its other games.⁴⁴

164. Figure 37 shows the commission rates that Epic pays to game transaction platforms based on figures produced by Epic.



45

³⁵ DX-3966

³⁶ DX-4363

³⁷ DX-3812

³⁸ DX-4155

³⁹ DX-4256.019-20; DX-4425.004-005; DX-3582.003-005

⁴⁰ DX-3582.021, 025

⁴¹ DX-3583.003

⁴² DX-3587.007; DX-4425.004; DX-3464.031; DX-3567; Erik Kain, “‘Fortnite’ Is Finally Available On The Google Play Store,” *Forbes*, April 21, 2020, <https://www.forbes.com/sites/erikkain/2020/04/21/fortnite-is-finallyavailable-on-the-google-play-store/?sh=5525b10c5c82>.

⁴³ DX-4425.005; Deposition of Joe Kreiner, February 5, 2021, p. 52

⁴⁴ DX-4322; Epic Games, Inc.’s Responses and Objections to Apple Inc.’s Second Set of Interrogatories, at 12–13 (Jan. 19, 2021)

⁴⁵ DX-4457

Figure 37
Epic commission rate to third parties

Platform	Commission rate
Fortnite	
1. Microsoft	30%
2. Sony ^[1]	30%
3. Nintendo Co., Ltd.	30%
4. Apple Inc.	30%
5. Gearbox Software, LLC ^[2]	[REDACTED]
6. Samsung Electronics Co., Ltd	[REDACTED]
7. Google Inc	30%
Rocket League	
8. Microsoft	30%
9. Valve Corporation	30%
10. Sony	30%
11. Nintendo Co., Ltd.	30%
12. Other	30%
Dauntless	
13. Sony	30%
14. Microsoft	30%
Paragon [Retired]	
15. Sony	30%
16. Microsoft	30%
Unreal Tournament	
17. Valve Corporation	30%
Battle Breakers	
18. Apple Inc.	30%
Infinity Blade	
19. Apple Inc.	30%

Source: DX-4800 (summarizing DX-4322)

165. In addition to Apple's commission rates being comparable to other digital game transaction platforms, Apple has not increased its commission rates over time.

166. In fact, far from increasing its commission rate, Apple has lowered its commission rate to 15% for certain transactions:

- In 2016, Apple lowered its commission rate to 15% for subscription renewals after the first year.

- Also in 2016, Apple lowered its commission rate to 15% for members of the Video Partner Program that stream premium TV content.
- Starting in 2021, Apple lowered its commission rate to 15% for all developers that generated less than \$1 million in proceeds (net commissions paid to Apple) during the previous calendar year from transactions through the App Store.

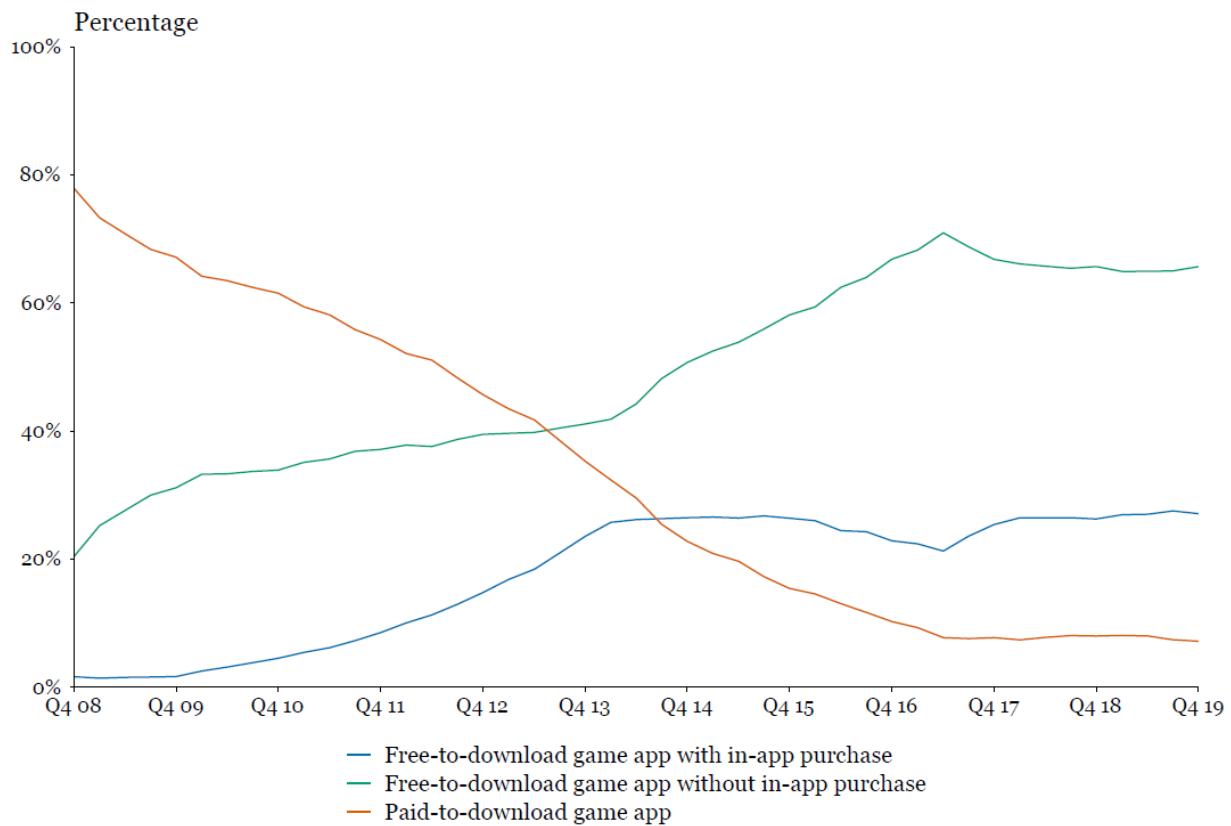
167. AppFigures (a mobile analytics provider) estimates that about 98% of developers generated less than \$1 million in proceeds during the previous calendar year, and thus qualify for the lower commission rate.⁴⁶ Thus, contrary to increasing prices, as would be expected if Apple had market power, many developers now face lower commission rates for game transactions on the App Store.

168. While Epic may argue that the introduction of in-app purchase functionality on the App Store in 2009 constituted a price increase for developers, this is incorrect. Prior to the introduction of in-app purchasing, developers could not offer such services to consumers through Apple. Thus, the introduction of in-app purchases was a new feature of the App Store. By charging developers a 30% commission on such purchases, Apple simply gave that new feature a price.

169. Game developers have also taken advantage of monetization strategies that allow them to pay zero commission to Apple. At launch, about 32% of apps on the App Store were free. As Figure 38 shows, an increasing majority of games are free-to-download and offer no in-app purchases, and thus are not subject to any Apple commission. In FY2019, approximately 66% of game apps were free-to-download and offered no in-app purchases and about 25% more were free-to-download with in-app purchases. In total, 76% of games and 83% of apps with at least one initial download on the App Store in FY2019 were free and did not have in-app purchases so did not generate any commissions to Apple.

⁴⁶ Ariel Michaeli, “Apple Just Changed the Rules, And (Almost) Everyone’s Getting a Bonus,” *AppFigures*, November 26, 2020, <https://appfigures.com/resources/insights/apples-gift-to-developers-is-a-win-win>

Figure 38
Percent of App Store game apps by monetization type (July 10, 2008 – September 30, 2019)



Source: DX-4802 (summarizing DX-5338)

170. The actual average commission rates paid by developers for initial game downloads have also decreased over time or remained constant.

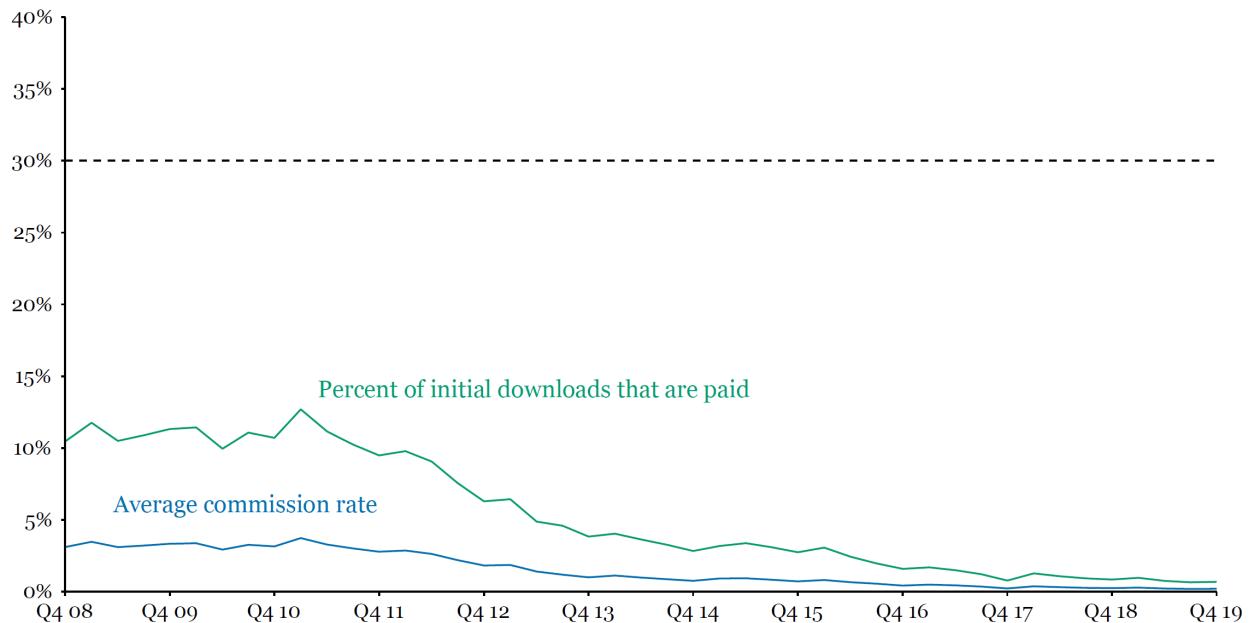
171. As discussed by Professor Schmalensee, the price paid in the context of a two-sided market is the total price that Apple charges for the transaction. For the App Store, the total price is often zero, such as for the download of free-to-download games.

172. Thus, to capture the price actually paid per transaction, I calculated the average commission rate charged to developers. I assigned app transactions with no associated revenue a commission rate of 0% in order to include these transactions in the “average commission rate.”

173. My analysis shows that because of the increasing prevalence of free-to-download game apps, the average actual commission rate on initial game downloads has declined over time (Figure 39).

Figure 39

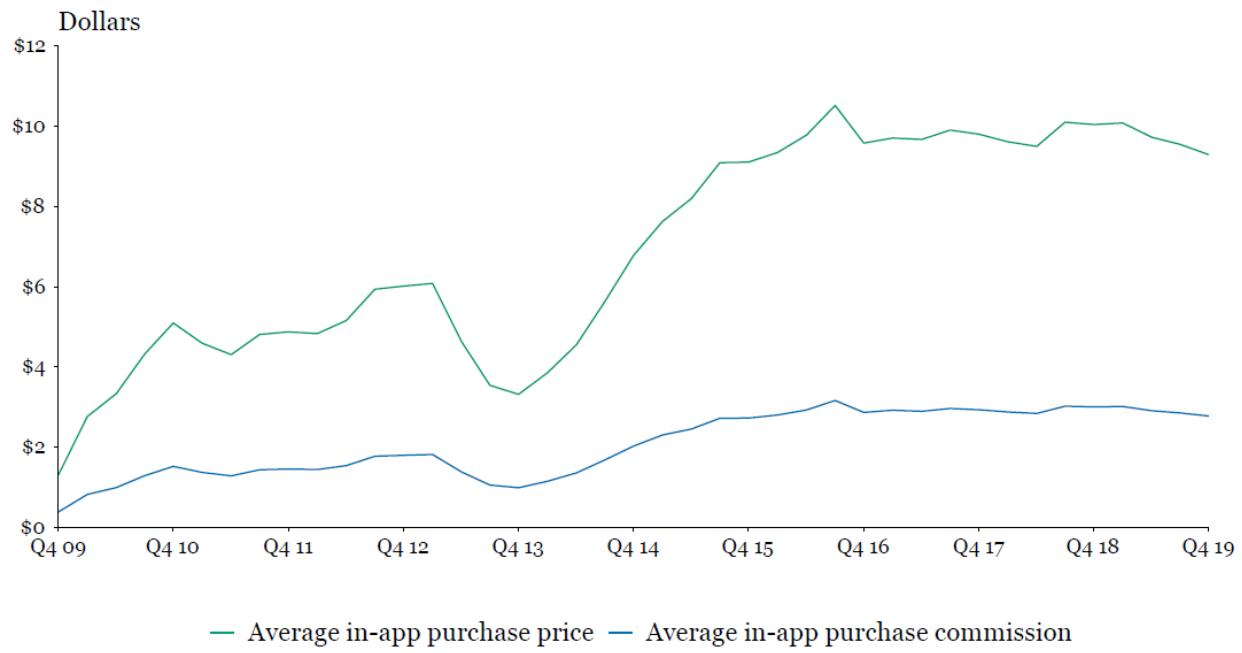
Average commission rate for App Store initial game downloads (July 10, 2008 – September 30, 2019)



Source: DX-4803 (summarizing DX-5338)

174. I also looked at the average commission paid to Apple in dollar terms from in-game purchases. I show the average commission paid per in-game purchase transaction as well as the average in-game purchase price in Figure 40. As can be seen in this exhibit, while the commission rate on game in-app purchases has remained relatively constant over time, the average commission in dollar terms paid to Apple has risen over time due to increases in the average price set by developers for in-app purchases for games.

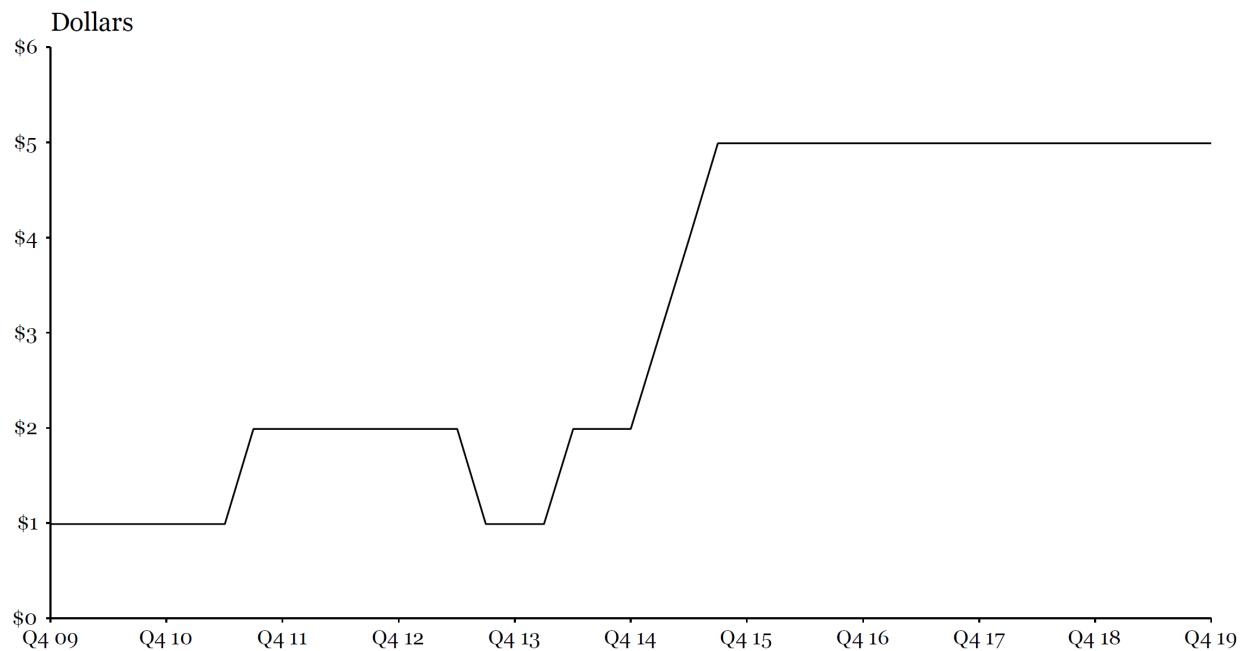
Figure 40
Average commissions and prices from App Store in-app game purchases (July 1, 2009 – September 30, 2019)



Source: DX-4806 (summarizing DX-5338)

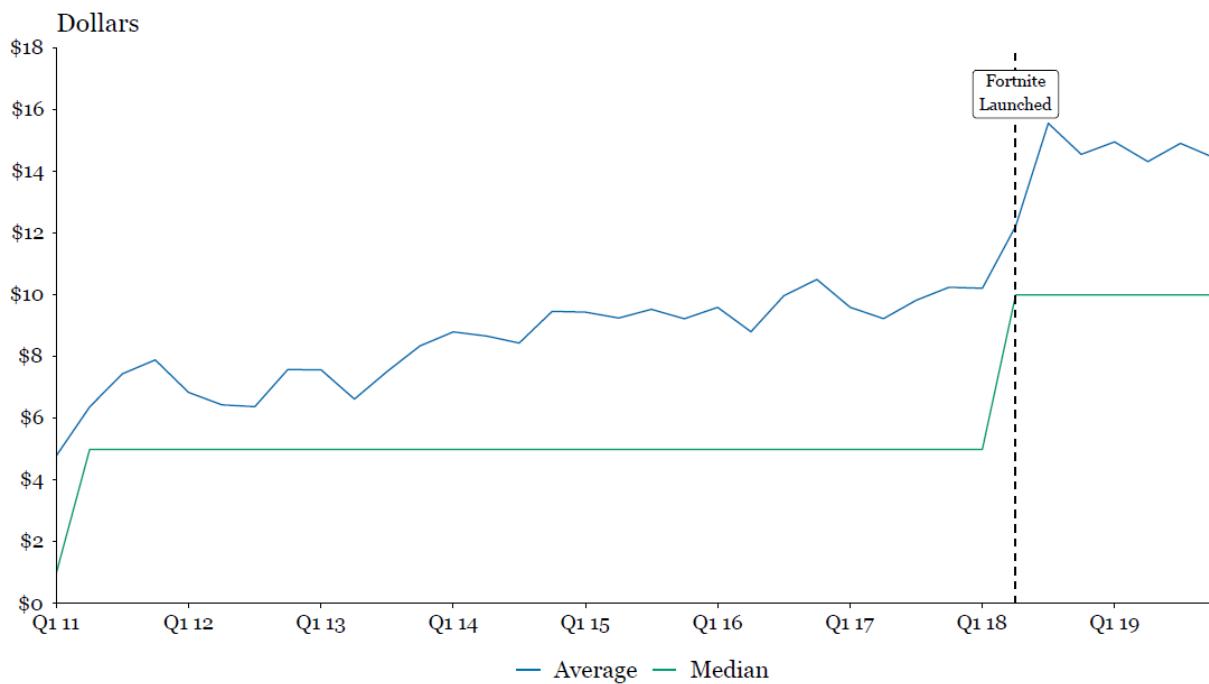
175. I also graph the median price set by developers for game in-app purchases in Figure 41. The trend in the median in Figure 41 is similar to the trend in the average shown in Figure 40. The average and median price of in-app purchases charged by Epic, which I graph in Figure 42 likewise show an increase over time, especially after the launch of Fortnite. The trends in the price of in-game purchases for developers in general and for Epic in particular confirm that the increase in the average commission in dollar terms paid to Apple for game in-app purchases is driven by higher prices set by developers rather than an increase in Apple's commission rate.

Figure 41
Median price of game in-app purchases (July 1, 2009 – September 30, 2019)



Source: DX-4807 (summarizing DX-5338)

Figure 42
*Average and median in-app purchase price for Epic apps through the App Store over time
(December 21, 2010 – September 30, 2019)*



Source: DX-4757 (summarizing DX-4757)

176. I also considered evidence of market-wide pricing, including commissions charged by other game transaction platforms. I find that commission rates have also declined on these competing game transaction platforms.

- In January 2018, (following Apple) Google Play reduced its commission rate to 15% for all subscription renewals after the first year.⁴⁷
- In November 2018, Valve, which is Steam's parent company, lowered commission rates for the largest developers. Commissions were lowered to 25% for developers with revenues through Steam between \$10 million and \$50 million annually and to 20% for developers with revenues through Steam exceeding \$50 million annually.⁴⁸
- Most recently, in March 2021, Google Play announced that starting July 1, 2021, it would decrease its commission rate to 15% on the first \$1 million in developer revenue.⁴⁹

⁴⁷ DX-3966

⁴⁸ DX-3599

⁴⁹ Chaim Gartenberg, “Google will reduce Play Store cut to 15 percent for a developer’s first \$1M in annual revenue,” March 16, 2021, <https://www.theverge.com/2021/3/16/22333777/google-play-store-fee-reduction-developers-1-million-dollars>

177. These declines in the commission rates charged by other game transaction platforms are inconsistent with Apple possessing market power.

178. As with the App Store, other transaction platforms also offer free-to-download games that do not incur commissions. Game transaction platforms such as Google Play offer many free-to-download games. Free-to-download games are not limited only to game transaction platforms for mobile devices; free-to-download games for consoles and PCs have also increased over time.

179. Dr. Evans purports to have calculated an average effective commission rate on the App Store of 27.7% in 2019. However, he fails to account for free transactions when performing his calculation. As I showed above in Figure 39, initial game app downloads that are paid have declined to less than 1%, meaning over 99% of initial game app downloads were free and did not pay a commission to Apple. Dr. Evans inexplicably fails to account for the overwhelming majority of game app download transactions when calculating the average effective commission rate. In fact, his average effective commission rate would be the same if the number of free initial game app downloads were 99%, like it is, or 1%.

180. These free initial download transactions all had a price—\$0—but Dr. Evans’ does not attempt to consider this price when calculating his average commission rate. Dr. Evans’ failure to consider free transactions leads him to overestimate the average commission rate by a factor of at least three for all apps. For FY2019, applying a proper measure of transaction price in a two-sided market, I find that developers paid Apple an average commission rate of 8.1% for games and 4.7% for all apps.⁵⁰

ii. Evidence does not show that Apple has exercised market power to reduce output

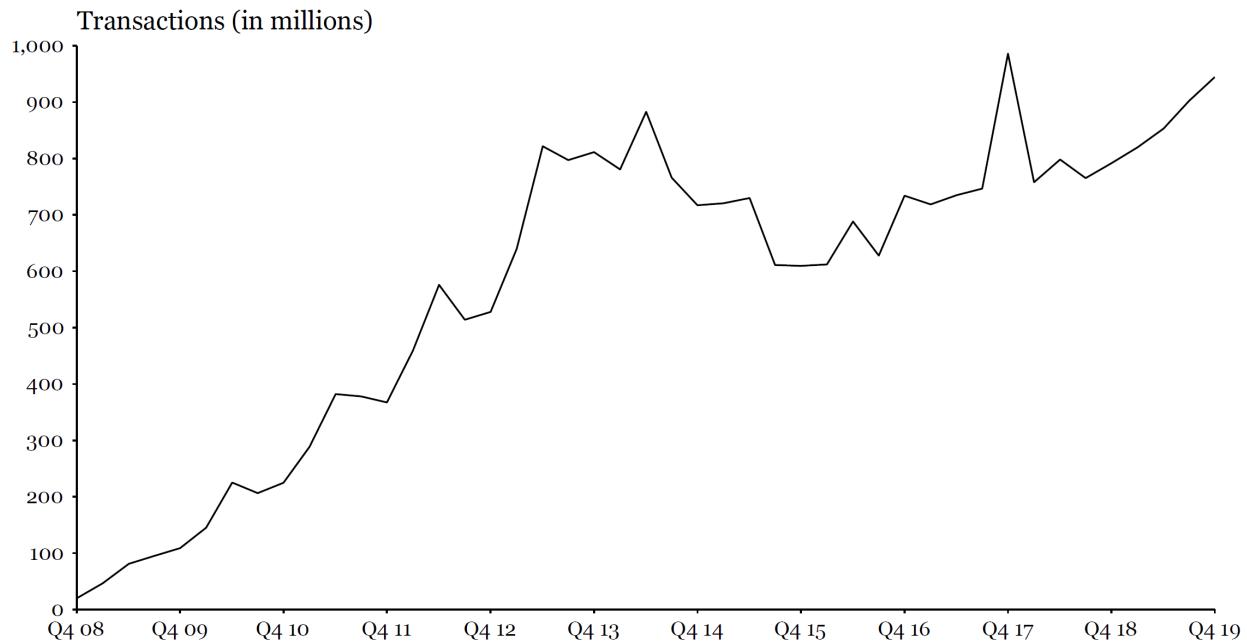
181. The evidence also shows that Apple has not exercised market power to reduce output in the digital game transaction market.

182. Output on the App Store has increased since its launch. In the beginning, the App Store’s U.S. storefront offered 452 third-party apps (including 131 game apps) by 312 distinct developers. In the FY2019, there were over 300,000 game apps available on the App Store.

183. Figure 43 shows the total number of game transactions—both free and paid initial downloads and in-app purchase—since the beginning of the App Store. It shows that the total number of game transactions on the App Store has increased many times over. Between the year following the App Store’s launch in 2008 and FY2019, game transactions grew by over 1,200%. Figure 44 shows total developer revenues from game apps through the App Store since its launch. It shows that total revenue earned by developers has risen dramatically over time: between 2010 and 2018, developer revenues from game apps grew by 2,600%.

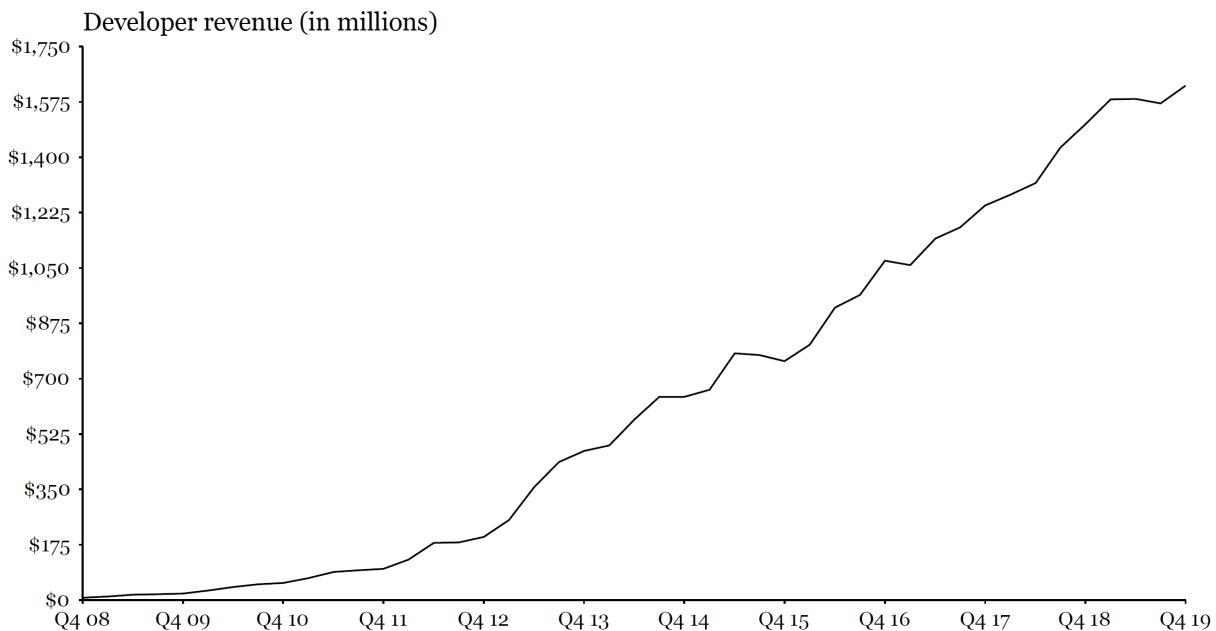
⁵⁰ DX-5469

Figure 43
App Store initial game downloads and in-app purchases (July 10, 2008 – September 30, 2019)



Source: DX-4810 (summarizing DX-5338)

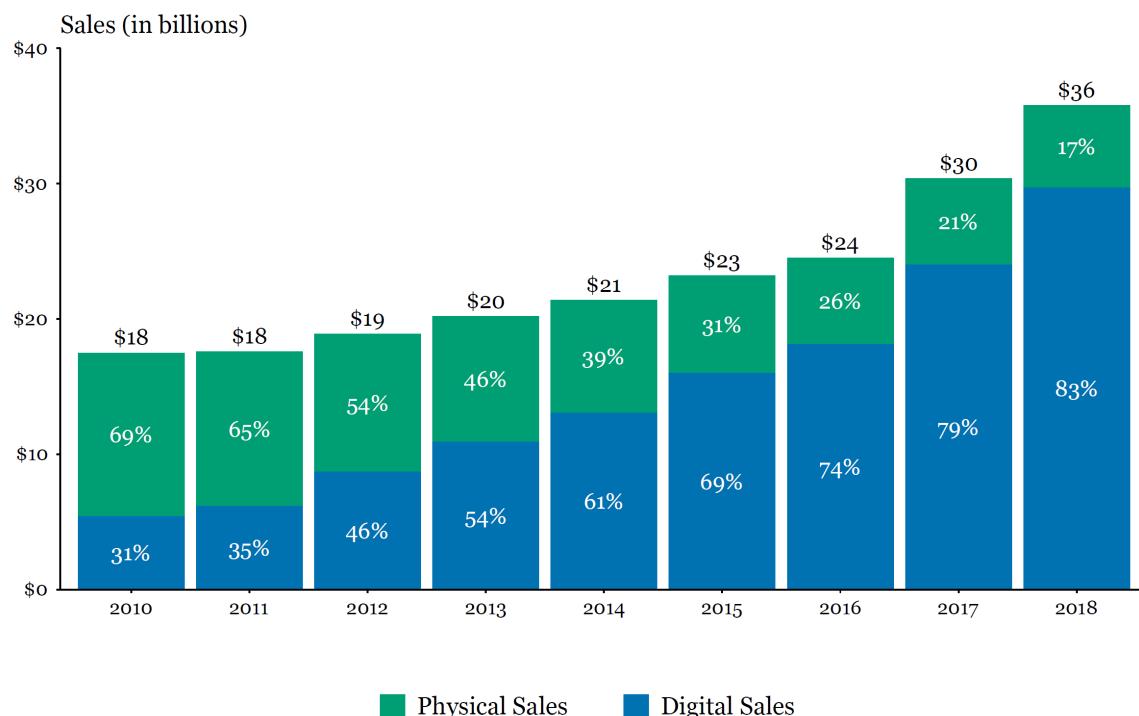
Figure 44
Developer revenue from App Store initial game downloads and in-app purchases (July 10, 2008 – September 30, 2019)



Source: DX-4811 (summarizing DX-5338)

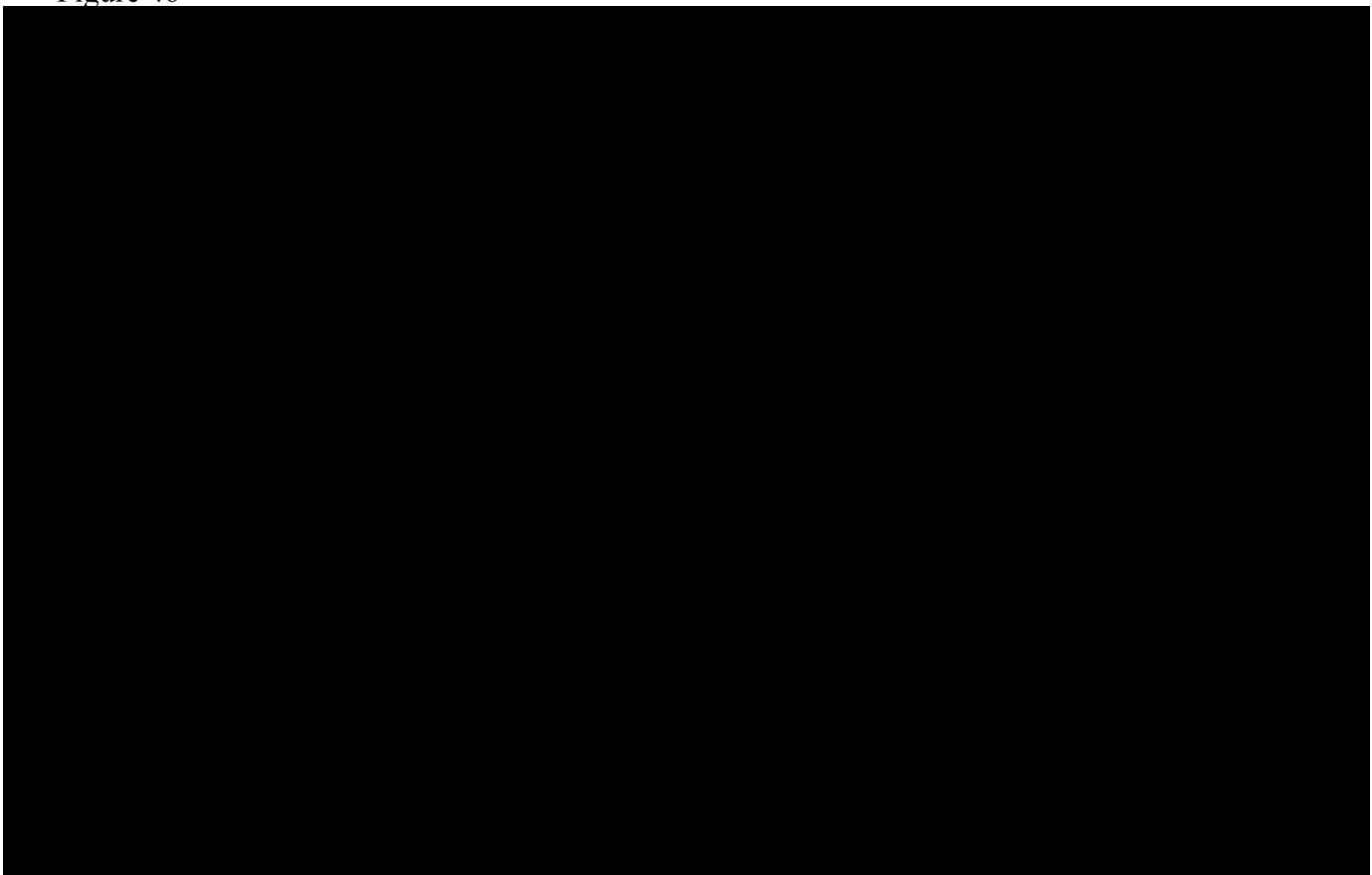
184. Further evidence that Apple has not restricted output is the growth in the market-wide value of digital game transactions over time. My analyses show that U.S. consumers spent \$29.7 billion on digital game transactions in 2018, up from just \$5.4 billion in 2010 (see Figure 45). The share of game spending that happens digitally has also risen over this time period, from 31 percent to 83 percent. These increases are not limited to the App Store: worldwide developer revenue from game downloads and in-app purchases on Google Play has also grown significantly over time, as I show in Figure 46. Between calendar years 2013 and 2018, total annual game revenue for developers on Google Play increased by a total of [REDACTED]

Figure 45
Amount spent by U.S. consumers on game transactions (2010 – 2018)



Source: DX-4808

Figure 46



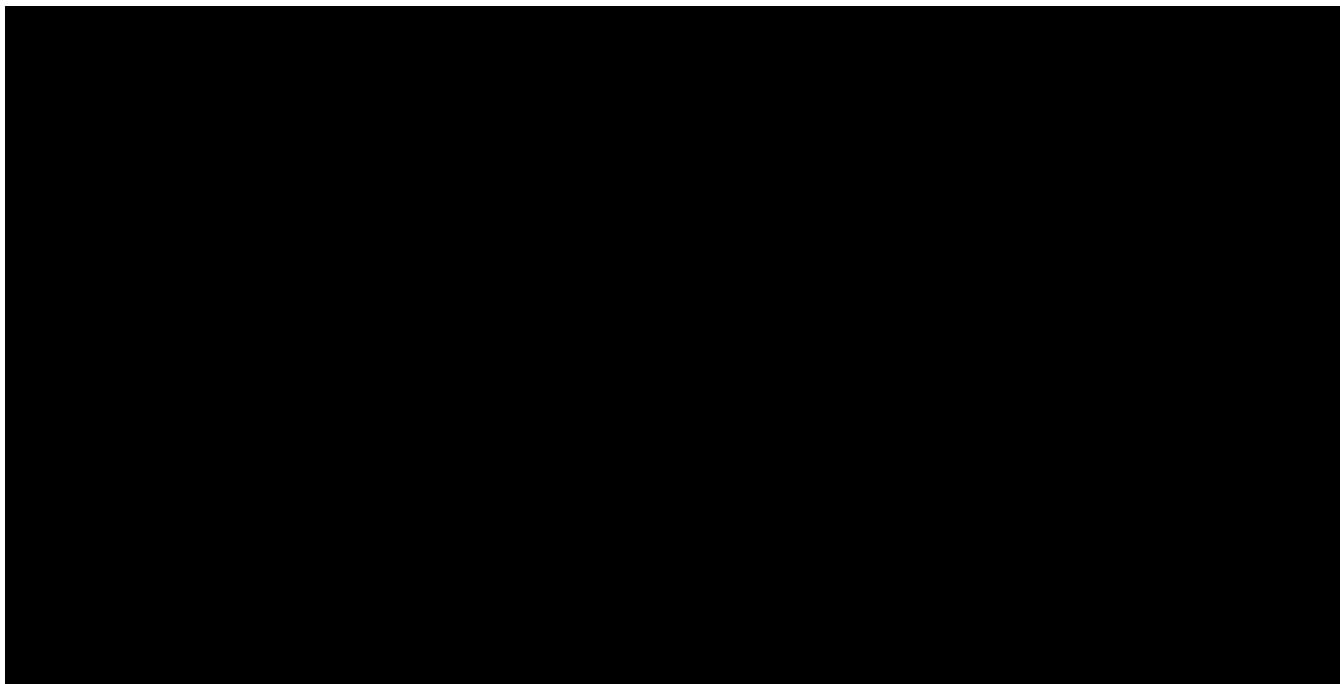
Source: DX-4809 (summarizing DX-3584)

185. Growth on the App Store has outstripped market-wide growth, providing additional evidence that Apple has not restricted output. Market-wide spending on digital game transactions grew around 448% from 2010 to 2018, but developer revenue for digital game transactions on the App Store grew by more than 2,600% over the same time period, nearly six times the industry rate. Simply put, these facts are inconsistent with Apple having market power.

186. Sales of iOS devices that can be used for game transactions have also increased since the launch of the iPhone and the iPad. Since the exercise of market power to increase prices or reduce quality of game transactions could reduce demand for iOS devices, this growth in devices is another indicator that Apple has not exerted market power in the game transaction market.

187. In Figure 47 I plot unit sales of Apple iPhones and iPads in the U.S. from Apple FY2009 to FY2019. Unit sales of these iOS devices experienced significant growth after launch and annual sales of iOS devices continue to remain high. For instance, from 2009 to 2019, the number of iPhones sold in the U.S. increased from 9.7 million in 2009 to [REDACTED] in 2019. Apple also sold [REDACTED] iPads in the U.S. in 2019.

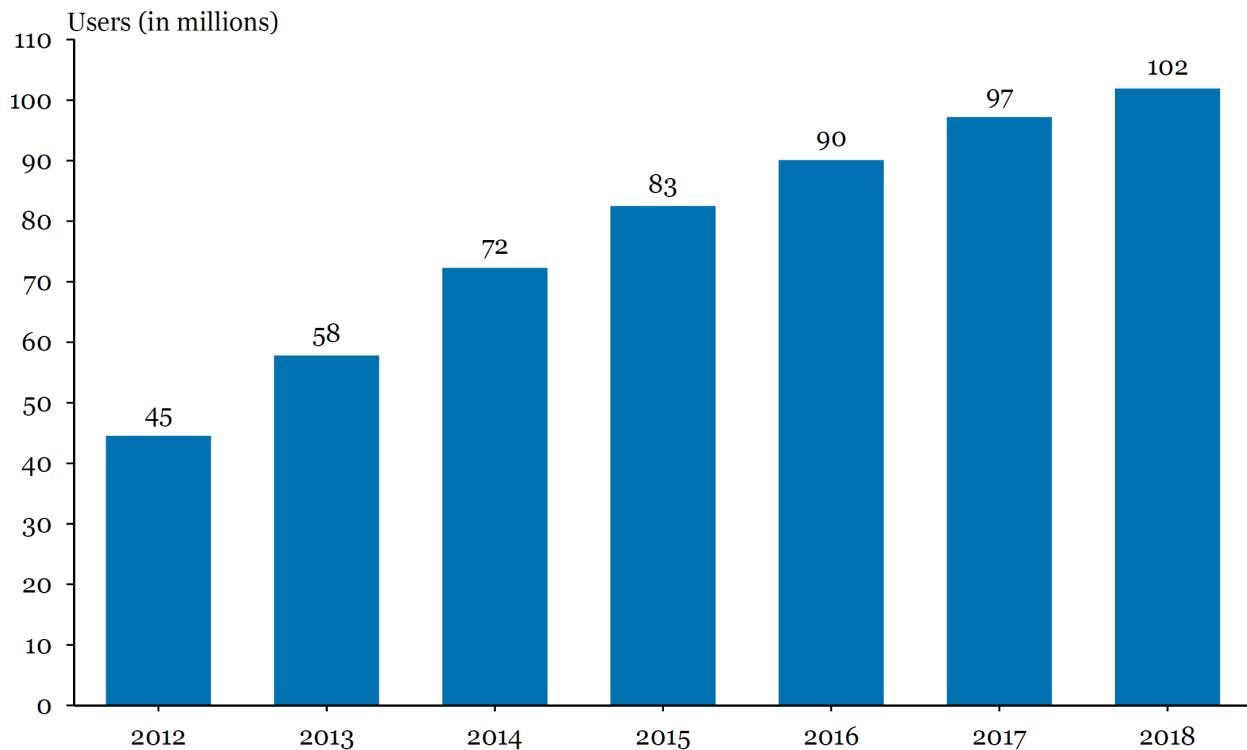
Figure 47
U.S. iOS device sales (2009 – 2019)



Source: DX-4815 (summarizing DX-4199)

188. Consistent with high sales of iOS devices, the total number of U.S. users of iPhones has been increasing each year. In Figure 48, I show the number of iPhone users in the U.S. over time. Between 2012 and 2018, the total number of iPhone users has increased from 44.5 million to 101.9 million.

Figure 48
U.S. iPhone users (2012 – 2018)



Source: DX-4816 (summarizing DX-4938)

189. The growth in devices for accessing game transactions has not been limited to iOS devices and is consistent with increasing ownership of smartphones and tablets in the U.S. The proportion of the U.S. adults who own a smartphone has increased from 35% in May 2011 to 81% in February 2019.⁵¹ Similarly, the proportion of U.S. adults who own a tablet has increased from 3% in May 2010 to 52% in February 2019.⁵² The continued growth in the iOS platform in particular and the continued growth in smartphone use overall is inconsistent with restricting output but consistent with increases in overall economic value created by the iOS ecosystem to consumers and developers.

190. In addition to the growth in smartphones and tablets, consoles continue to be popular, including the introduction of new consoles. The prior generation of major consoles started with launch of the Nintendo Wii U in 2012, followed by the Xbox One and PS4 in 2013. The present generation of major consoles began with the Nintendo Switch in 2017 followed by the launch of the PS5 and XSX in November 2020. Such consoles have experienced success recently. The Nintendo Switch's 2020 sales as of November were “the second highest of any [game console]

⁵¹ DX-4453

⁵² DX-4453

platform in U.S. history.”⁵³ Furthermore, the recently launched PS5 and XSS consoles experienced strong sales since launch, with retailers frequently out of stock and unable to meet the demand.

iii. Evidence shows that Apple has not exercised market power to reduce quality

191. Despite the evidence that game transactions on the App Store are growing faster than a close competitor, Dr. Evans claims that Apple has failed to innovate or invest in improving the quality of the App Store. Setting aside that Dr. Evans based this opinion on developer complaints from surveys that Apple conducted specifically to help them understand developer concerns and improve the App Store, Dr. Evans also errs by ignoring that the quality and value of the App Store platform—as well as the app transactions it facilitates—are improved by Apple’s innovation across its software and hardware ecosystem.

192. As Apple executives will testify, Apple has made enormous investments and innovations that impact the quality of games delivered through the App Store. Among the long list of such investments, Apple has invested in developing high performance graphics processing units and the APIs and programming tools that enable developers, especially game developers, to use these capabilities (such as the Metal graphics interface).

193. This investment has enabled much greater quality for mobile versions of graphics intensive games such as Fortnite. Investments in alternative reality (AR) hardware, software, APIs, and development tools (e.g., ARKit) have made it possible for new types of games to appear on iOS devices, such as Pokémon GO.

194. The sheer variety of games on the App Store shows that Apple’s innovations across the iOS ecosystem have improved the types and quality of games feasible on iOS devices. Many new games (like Fortnite, PUBG, and Call of Duty Mobile) that previously only would have been available on consoles and PCs are now available on iOS devices due to Apple’s innovations. At the same time, top iOS games include a wide variety of different types of games. These games range from content creation games like Minecraft to tower-defense games, board-game adaptations, resource-management simulators, console game adaptations, and more. ~~Mr. Sweeney’s 2010 prediction that “over the next decade, iPhone and iPad games will grow” has been proven correct.~~⁵⁴

195. Even looking just at store services, as Dr. Evans does, Apple has been a driver of innovation. For instance, Apple was the first major platform to introduce in-app payments, the now dominant form of game monetization in the App Store.

196. Developers understand that iOS is an attractive platform, especially for games, because of how much revenue they can generate on iOS compared to other transaction platforms. For instance, Fortnite data show that iOS generated the most revenue for Epic per hour of user play time among all platforms (see Figure 49). This suggests that the App Store provides higher

⁵³ Jeff Grubb, “Nintendo Switch is on a blazing sales pace for 2020 in the U.S.,” VentureBeat, November 13, 2020, <https://venturebeat.com/2020/11/13/nintendo-switch-is-on-a-blazing-sales-pace-for-2020-in-the-u-s/>.

⁵⁴ DX-4620.002

quality from the developer perspective as indicated by the ability to more effectively monetize play time than other alternatives. The fact that consumers are willing to spend more per hour played on iOS than on other platforms also indicates greater relative value.

Figure 49
Worldwide Fortnite revenue per hour played by platform (May 2020 – July 2020)

Platform	Revenue per hour
1. iOS	\$0.22
2. Xbox One	\$0.19
3. Google	\$0.18
4. Android	\$0.16
5. Switch	\$0.15
6. PS4	\$0.13
7. PC	\$0.10
8. Other	\$0.10

Source: DX-4817 (summarizing DX-5339)

197. All of the evidence presented on market outcomes presents a clear story. Apple has not raised prices, Apple has not restricted output, and Apple has not reduced quality in the game transaction market. This is entirely inconsistent with Apple possessing market power in the game transaction market.

iv. Purported estimates of the App Store's profits do not show Apple has market power

198. Dr. Evans asserts that his measures of the App Store's profit margin demonstrate that Apple has market power. I disagree. As Professor Schmalensee and Professor Lafontaine discuss, profit margins do not provide insight into whether a firm has market power.

199. Moreover, the analysis Dr. Evans' conclusion is based on is flawed. Among other flaws, Dr. Evans compares what he claims to be the App Store's profit margin to five allegedly comparable companies selected by another Epic expert, Mr. Barnes. However, none of these five companies are truly comparable. Unlike the App Store, these five companies are platforms for transacting physical goods or services, not for digital transactions. These five companies also differ from the App Store along other dimensions, such as whether the platforms are integrated into hardware provided by the company, the demographics of platform users, the geographic markets in which they compete, and brand value. These comparable companies cannot be used as benchmarks to determine what Apple's profits would be in any but-for world, and without a valid benchmark, Dr. Evans cannot conclude that Apple earns outsized profits from the App Store.

C. Apple's ability to exercise market power would be limited by a number of factors even if the relevant two-sided market were limited to iOS apps

200. Even if one considered, contrary to the evidence, a two-sided market limited to the distribution of iOS apps (but not limited to games), Apple would still be constrained from exercising market power in that market by many factors.

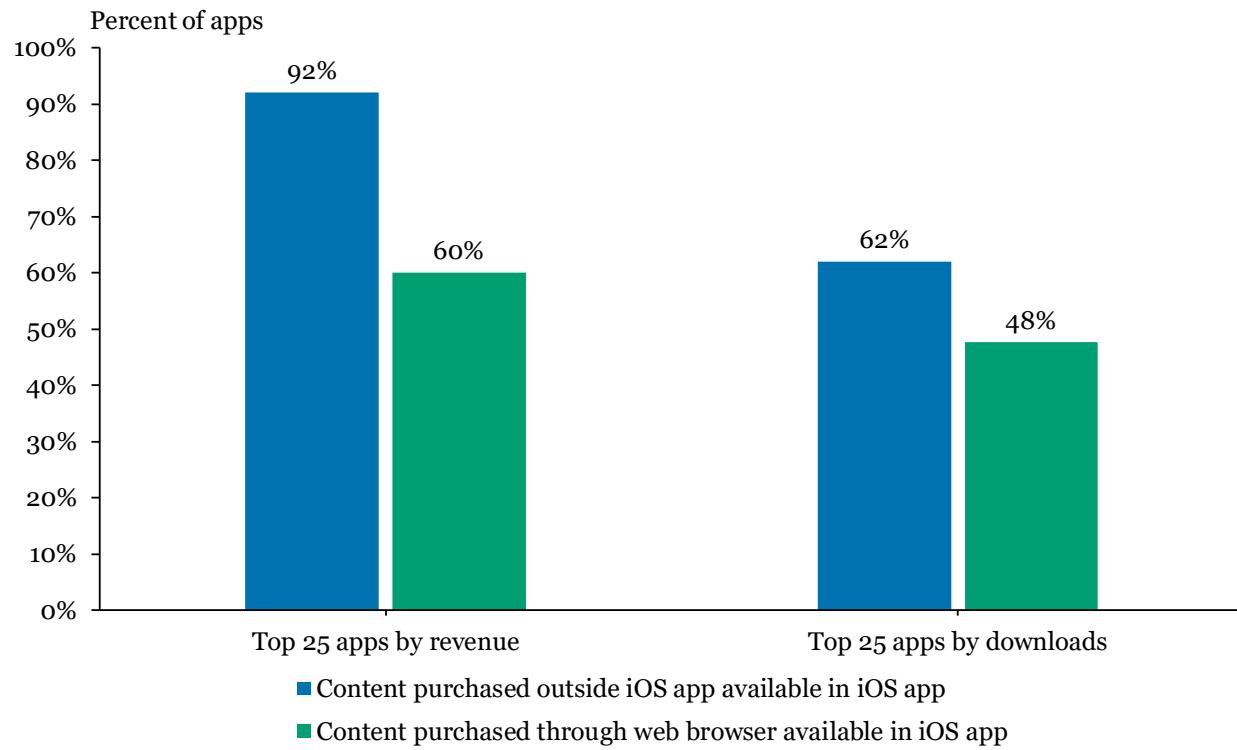
i. Developer choice constrains Apple from exercising market power

201. Game developers (and developers of other apps) face few restrictions on monetization. Like many game developers, developers of popular iOS apps have chosen to let consumers pay for content outside of the iOS app but still consume the content within the app, which constrains Apple's ability to exercise market power and charge supracompetitive prices. Amazon Prime Video, YouTube, Microsoft Office, and Netflix are just a few examples of popular apps that employ this model.

202. Developers can also incentivize consumers to purchase content outside of the iOS app. For instance, Apple allows developers to choose how they would like to price their apps and app content, including how they price across different transaction platforms and how they price when selling directly to consumers. Some developers have chosen to charge consumers more within the iOS app than in other avenues for payment, encouraging consumers to shift their purchases to these other locations.

203. Many developers choose to allow consumers to purchase content outside an iOS app but allow those users to use the content within the app. My analysis of top apps on the App Store shows that many allow consumers to purchase content outside of the App Store that can be used within the iOS app, which does not require the developer to pay a commission to Apple. I illustrate this analysis in Figure 50. In addition to game apps such as Fortnite, the list of the top 25 App Store apps by revenue includes streaming apps such as YouTube and Netflix and dating apps such as Tinder and Bumble, while the list of top 25 App Store apps by downloads includes Uber, Amazon Shopping, Snapchat, Instagram, and Facebook.

Figure 50
Percent of FY2019 top 25 App Store apps offering portable digital content



Source: DX-4798 (summarizing DX-5338, online public materials)

ii. The ability of developers to use alternative business models besides paid downloads and in-app purchases constrains Apple from exercising market power

204. Developers have many options for monetizing an app that entirely avoid paying a commission to Apple. This ability to generate revenue from an iOS app but avoid paying a commission to Apple constrains Apple from exercising market power.

205. As I just discussed, one way that developers monetize an iOS app outside of the App Store is by allowing consumers to purchase content outside of the app that can be used within the app. A developer can choose to sell such content on other transaction platforms as well as through its website. An especially common practice for game apps is to sell digital currencies (like V-bucks) across transaction platforms or websites. These currencies are then usually tied to the user's account and can typically be spent wherever the consumer chooses to play the game.

206. App developers can also choose to sell subscriptions outside of the app that give the subscriber access to content in the iOS app. In fact, Apple even allows developers of certain "reader" apps to sell subscriptions to consumers outside of the App Store without simultaneously offering the subscription for purchase within the App Store. Apps such as Microsoft Outlook, Netflix, and Match are all examples of apps that allow consumers to purchase subscriptions on other transaction platforms or through a website which then give the consumer access to content

within the app. Epic itself has also launched a new subscription service called “Fortnite Crew,” which consumers can purchase outside of the App Store.

App developers can also choose to monetize apps through in-app advertising. In fact, some iOS apps generate revenues almost entirely from in-app advertising. For example, Facebook and Instagram “generate substantially all of [their] revenue from advertising,” and over 92% of such advertising is on mobile devices.⁵⁵ Other popular apps such as Tinder, Microsoft Outlook, the Weather Channel, and the game Subway Surfers all generate significant revenue through in-app advertising, none of which requires paying a commission to Apple.⁵⁶ About 81% of game app developers monetize through in-app advertising.⁵⁷

207. Some apps also make money through promotional partnerships or sales of physical products. As one prominent example, Pok  mon Go earns a substantial amount of revenues through advertisements for sponsored “visits” to local stores.

208. These alternative business models and ways to monetize an iOS app all allow developers the flexibility to monetize outside of the App Store and avoid paying a commission to Apple, constraining Apple’s ability to exercise market power.

iii. The ability of consumers to switch away from iOS devices to Android devices constrains Apple from exercising market power

209. Apple would also be constrained from exercising market power because consumers can switch away from an iOS device to an Android device. The available evidence shows that, contrary to Dr. Evans’ and Professor Athey’s analyses, consumers often switch between iOS and Android devices. For example, one report I reviewed from the market research company Kantar showed that among prior iPhone owners who had purchased a new phone, between 12% and 26% switched to a different operating system from their prior phone.⁵⁸ Another study conducted for Google found that [REDACTED] of iPhone owners who purchased a new phone in the last year switched to Android.⁵⁹ As an economic matter, that is a meaningful number of consumers.

⁵⁵ DX-4004; Facebook, Inc., SEC Form 10-K for period ended December 31, 2018, filed on January 31, 2019, pp. 9, 44

⁵⁶ DX-5402; Aashish Pahwa, “How Does Tinder Make Money | Tinder Business Model,” *Feedough*, September 21, 2019, [https://www.feedough.com/tinder-make-moneybusiness-model/](https://www.feedough.com/tinder-make-money-business-model/); Can I Remove Ads?” <https://faq-subway.kiloogames.com/article/152-can-i-remove-ads>; and Apple, “App Store Preview: The Weather Channel,” <https://apps.apple.com/us/app/weatherthe-weather-channel/id295646461>

⁵⁷ Matt Miller, “Monetization Insights from App Professionals,” App Annie, November 14, 2017, <https://www.appannie.com/en/insights/mobile-strategy/app-marketers-developers-survey-2/>

⁵⁸ DX-3084

⁵⁹ DX-4310.012

210. The evidence cited by Dr. Evans shows the same thing. A Google survey from 2018 cited by Dr. Evans also found that [REDACTED] of smartphone purchasers were first time buyers.⁶⁰ Apple and Android compete for these first time buyers as well as existing smartphone owners who purchase a new device. I calculate that more than 78 million consumers in the U.S. (whether first-time buyers or existing smartphone owners) purchase a new smartphone each year.

211. Finally, the purported “switching costs” suggested by Dr. Evans and Professor Athey are, in many cases, valuable services that Apple provides and are consistent with iOS devices being differentiated products. Observing an iPhone owner purchasing a new iPhone does not mean that the consumer is locked-in: consistent with consumer surveys, purchasers of a new iPhone are often satisfied with their iPhone purchase and prefer the iOS ecosystem compared to Android devices. In fact, most iOS users who said they were extremely unlikely to ever consider buying an Android device referenced qualities of the iPhone and iOS to explain their choice: [REDACTED] cited their preference for iOS, and [REDACTED] cited their preference for the design and features of iPhones. Android users who switch to iOS echo preferences for the better design and user experience offered by Apple.⁶¹

212. As one example, Dr. Evans claims that consumers are locked-in to their iOS devices because they value iMessage, a messaging service provided by Apple. This is fundamentally flawed. To say that iPhone users are locked-in to their phones because they like iMessage is akin to saying BMW drivers are locked-in to their cars because they have better stereos and more comfortable seats.

213. Like those better stereos and seats, iMessage is an innovation with differentiated features that users value, not a switching cost—and certainly not something that amounts to “lock-in.” Users are free to leave the iOS ecosystem if they choose. Surveys show that many do. But many also prefer to remain within iOS because they derive significant value from its features. Apple has invested in adding new features to iMessage, like iMessage Apps, that offer enhanced functionality to users and new ways to interact via messages. There are numerous substitutes for iMessage that can operate on different platforms seamlessly; WhatsApp is one prominent example. However, users choose iMessage over those substitutes because of the innovative and convenient features that set iMessage apart from the others. Repeatedly choosing products with preferred features is an efficient decision, not evidence of an inability to switch. But in any event, it appears that iMessage and other services that only work with other iOS devices are not the main reason iPhone owners do not switch to Android: in one survey of iPhone owners who stated they would not switch to an Android smartphone, the use of iOS by friends and family was the least frequent reason cited for not switching.⁶²

214. Many of Dr. Evans’ and Professor Athey’s other alleged “switching costs” are overstated or inconsistent with market realities and are thus not indicative of lock-in.

- There is no evidence that learning a new operating system is a significant impediment to switching between iOS and Android phones.

⁶⁰ DX-3598.006

⁶¹ DX-3441.006-008; **DX-3598.027**

⁶² DX-3598.027

- Smartphone OEMs offer services that facilitate transferring data from an iOS device to a new Android device.
- As I have already shown, most top apps are available on both Android and iOS, and many developers allow users to transfer content between devices through single-sign on.
- Multiplatform services such as WhatsApp and Zoom provide alternatives to Apple's iMessage and FaceTime, and studies confirm that having friends or family that use iOS devices is not a significant reason why iOS device owners choose not to switch to Android devices.⁶³

D. Market outcomes, such as price and quantity, are inconsistent with Apple exercising market power in an alleged iOS app distribution market

215. While the relevant market in this matter is the market for digital game transactions, I also assumed for the sake of argument that Dr. Evans is correct and that the relevant market is his alleged market for iOS app distribution. I then analyzed market outcomes such as price and output to determine whether Apple possesses market power in this alleged market. I find that the evidence is inconsistent with Apple possessing market power even if Dr. Evans' flawed market were correct.

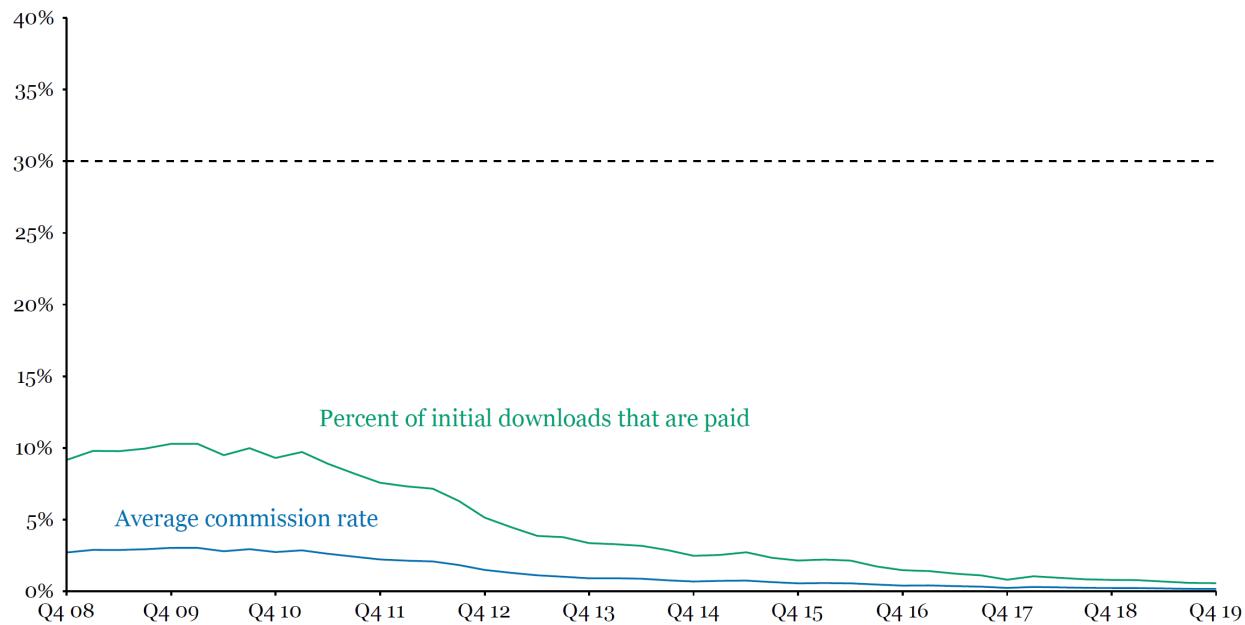
216. Apple does not charge a supracompetitive commission rate even when considering an incorrect market for iOS app distribution. These transactions are subject to the same commission rates as game transactions, which Apple has only lowered over time.

217. Additional evidence based on the Apple transaction data backs up the fact that prices have declined over time, not increased.

- Figure 51 shows that the percent of initial downloads that are paid on the App Store has declined over time and that the average commission rate on initial downloads for all apps on the App Store has declined over time.
- Figure 52 shows that the average commission rate on in-app purchases for all apps on the App Store has declined over time.

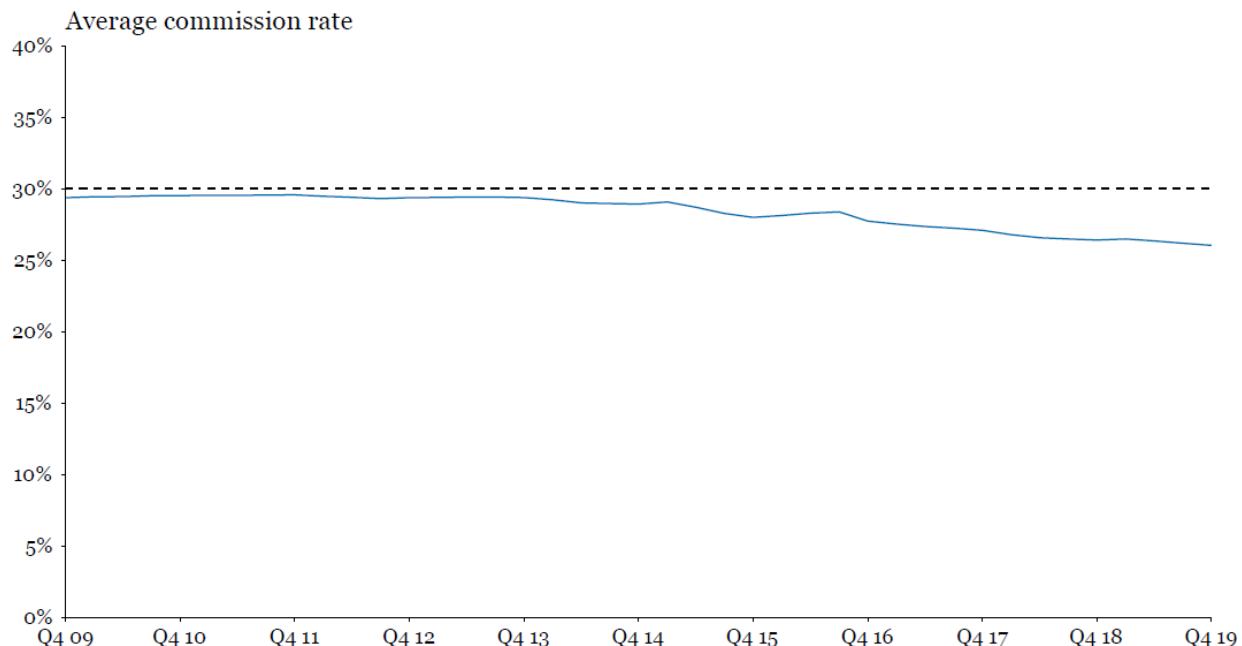
⁶³ DX-3598.027

Figure 51
Average commission rate for App Store initial downloads (July 10, 2008 – September 30, 2019)



Source: DX-4818 (summarizing DX-5338)

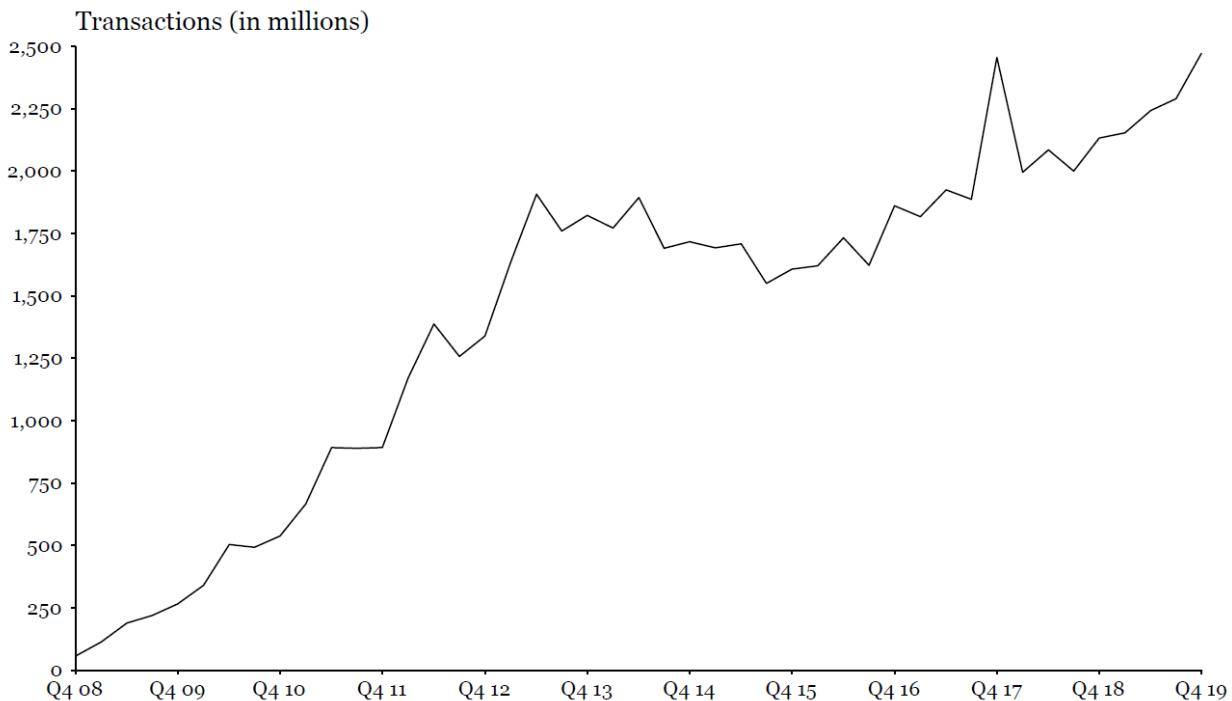
Figure 52
Average commission rate for App Store in-app purchases (July 1, 2009 – September 30, 2019)



Source: DX-4819 (summarizing DX-4819)

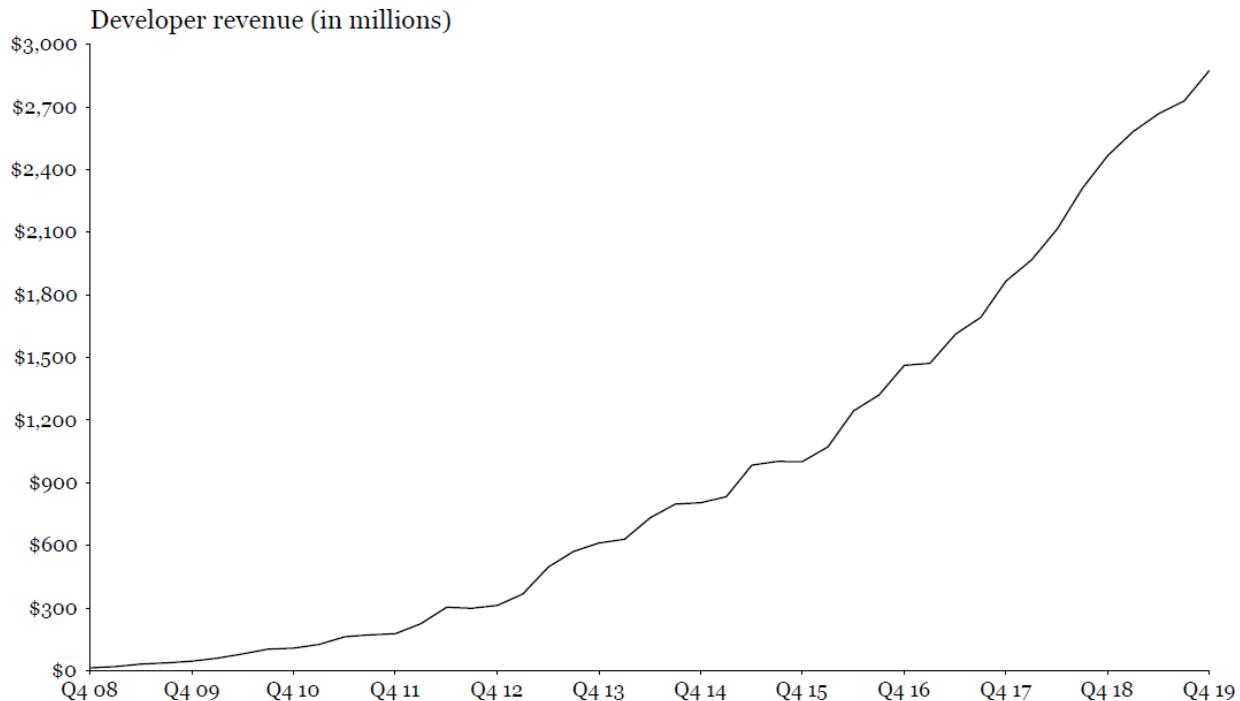
218. Just as Apple has not restricted output for game transactions, Apple has not restricted output for transactions on the App Store for apps in general. In Figure 53 and Figure 54, I show that the total number of transactions and total developer revenues for all apps on the App Store over time. The increase over time is dramatic. Since the launch of in-app purchases in mid-2009, the total number of annual transactions for apps has increased nearly 500% and total revenue earned by developers has increased by over 3,700%.

Figure 53
App Store initial downloads and in-app purchases (July 10, 2008 – September 30, 2019)



Source: DX-4812 (summarizing DX-5338)

Figure 54
Developer revenue from App Store initial downloads and in-app purchases (July 10, 2008 – September 30, 2019)



Source: DX-4813 (summarizing DX-5338)

219. Dr. Evans claims that Apple obtained monopoly power in iOS app distribution around 2010 (Evans Deposition, p. 334, Evans WDT, ¶91). If that were true, one would expect to see Apple restricting output or raising prices around that time. But the data show the exact opposite. The average commission rate on both initial downloads and in-app purchases continued to decline after 2010, and the growth in free-to-download apps only accelerated. The graphs on game transactions and developer revenues make obviously clear that transactions and revenues continued to increase after 2010 without any decline in the growth rate. In fact, as mentioned, total annual game revenue for developers from mid-2009 to FY2019 increased by more than 3,700%, from \$282M to \$10.9B. In the period from the first quarter of FY2010 to the first quarter of FY2011, total game revenues for developers increased from \$30.1M to \$69.4M, or 130%, which is again inconsistent with Apple exercising market power.

220. Overall, Dr. Evans' assertion that Apple obtained monopoly power in iOS app distribution around 2010—or at any point, for that matter—is completely contradicted by the data.

V. Dr. Evans' market definition and market power conclusions are wrong factually and for this case

A. Dr. Evans incorrectly concludes that there are no good substitutes to the App Store for consumers and developers to conduct digital game transactions

221. Dr. Evans' approach to market definition, and hence market power, is unreliable and inconsistent with the market facts described above. Dr. Evans ultimately concludes that there are no substitutes for consumers or developers to transact through the App Store with each other for games and apps. This flows from his opinion that the vast majority of consumers who own an iPhone are locked into owning one for as long as they own a smartphone, and that these same consumers have no substitute options for making game transactions or app transactions in general other than through the App Store on their iPhone. My analysis above makes clear that this is not supported by market facts or data.

222. Dr. Evans reaches unreliable conclusions because he does not start with the product at issue, game transactions—or even app transactions in general—and consider what substitutes developers and consumers have for making them other than through the App Store. Instead, his analyses are premised on the faulty assumption that the only way consumers and developers can substitute for game transactions made in the App Store is if other devices are themselves substitutes for an iOS device at all times of day and with the same device features.⁶⁴ Dr. Evans' analysis is divorced, both theoretically and factually, from the economic realities of this market, as I discuss in turn below.

B. Dr. Evans is mistaken to claim that devices need to be direct substitutes to allow for game, or app, transaction substitution

223. Dr. Evans appears to accept that the App Store provides transactions between consumers and developers, yet his market definition analysis does not focus on this product or the substitutes available for it. The product at issue in this matter is digital game transactions between consumers and developers as that is what Apple provides simultaneously to Epic and Epic's customers. The economic question for market definition and market power, then, is to what degree Apple faces competition in providing digital game transactions to developers and consumers. Dr. Evans does not assess the relevant economic question and instead defines two markets—a foremarket for smartphone operating systems and an aftermarket for iOS app distribution—which are inappropriate and uninformative.

224. *For his alleged foremarket for smartphone operating systems*, Dr. Evans claims that consumers and developers do not have practical substitutes for smartphone operating systems because, in his opinion, other devices (such as computers, game consoles and even tablets using a similar operating system) are not substitutes to smartphones for consumers. From this he concludes that consumers do not have substitutes for smartphone operating systems for using apps. This is faulty logic. Neither operating system substitution nor device substitution is necessary for game, or app, transactions across platforms to be substitutes. As I have shown above, consumers and developers can substitute game transactions across a variety of transaction

⁶⁴ Evans Direct Testimony, ¶¶ 50-53

platforms as well as through websites on an iOS device. Dr. Evans’ focus on device substitution leads him to misrepresent these options available to consumers and developers for making game transactions. For example, Dr. Evans acknowledges that consumers generally own multiple devices on which to make game transactions and app transactions.⁶⁵ Yet he argues that this undisputed fact, which obviously increases the ease of multi-homing across different transaction platforms, is instead evidence of consumer *inability* to substitute the devices for each other, and thus, as his faulty logic follows, to use them to substitute game or app transactions. This is unreliable economic analysis.

225. **For his alleged aftermarket for iOS app distribution on smartphones,** Dr. Evans finds that Apple is a monopolist in his alleged iOS app distribution market. He does so by assuming that consumers cannot easily switch from owning iOS smartphones to owning other smartphones, ignoring that consumers often own multiple devices and can make app transactions on those devices, and assuming that consumers cannot make game transactions on websites and other game transaction platforms in substitution for making game transactions through the App Store. As I have shown previously, none of these facts is true.

C. Dr. Evans is wrong to assume that game transactions cannot be substituted across differentiated devices

226. Even on their own terms, Dr. Evans’ market definition is flawed. He offers limited bases for opining that consumers lack good substitutes for smartphone apps on other devices, and that, as a result, developers are unable to replace a substantial part of consumer demand for their services by turning to substitutes for smartphones apps. He claims that developers “must follow the customer to their smartphone OSs” because:

- Smartphones have “unique” features—mobility, constant Internet connection, camera, GPS, and accelerometers.
- There are portions of the day during which consumers may only have access to their smartphones in order to access the internet (or might find it “inconvenient” to use another device in their home).
- Developers cannot create web apps through mobile browsers that are good substitutes to native apps.

227. Dr. Evans provides no empirical analysis to support these assertions. Most importantly, he does not assess or establish the relevance of these features for the ability of developers and consumers to substitute across them to make game transactions. Thus, Dr. Evans sets a bar for substitution that makes no sense in the context of apps and games. Apple faces competitive constraints in its pricing for game transactions from many sources, not all of which offer every service or feature that an iOS device offers. Dr. Evans does not show for example, that many (if any) game apps, or apps in general, require mobility, constant Internet connection, camera, GPS or accelerometers in order to make game or app transactions. Nor does he acknowledge that developers have choices about what kinds of games they design and what features those games

⁶⁵ Evans Direct Testimony, ¶ 51

will have. None of the apps that he states work better when you have them “all the time” (e.g., Uber, Tinder, Snapchat, Google Maps, and Chase Bank) are game apps.

228. The empirical evidence I have shown above fills in this gap for Dr. Evans. Developers can reach consumers to transact outside of the App Store because consumers multi-home in their game play across devices and use different game transaction platforms. Game developers have, and actively pursue, these many different options for reaching consumers. Obviously, Fortnite does not require Dr. Evans’ “unique” smartphone features for its game, as it is available on PCs, tablets, consoles, and smartphones. And consumers clearly do not find it “inconvenient” to make Fortnite game transactions on those other devices, as even for those Fortnite players who have chosen to open an iOS account, over 90% of their game play and game spending is on PCs, tablets, and consoles. I also showed that the top game apps, and the top apps in general, both by revenue and by download, are offered on many different types of devices and thus clearly do not require this “unique” set of features to make transactions with consumers.

229. Operating systems and devices do not need to be perfect substitutes in all functions to compete with other operating systems and devices for a given function. As shown above, Apple faces competitive constraints in its pricing for game transactions from a variety of sources, not all of which offer every service or feature that an iOS smartphone does. Competition occurs in differentiated products, and the fact that products are not identical does not imply a lack of competition. Taking a brick-and-mortar example, multi-line retailers such as Target or Walmart that sell products across a variety of departments compete with specialty retailers that customers can instead visit to purchase the same or similar products. These multi-line stores compete with grocery stores in the grocery department, sporting goods stores in the sporting goods department, and clothing stores in the clothing department. Whether or not a local multi-line retailer faces a competitor with a comparable selection of departments does not change the fact that this multi-line retailer will compete with local specialty retailers.

D. Dr. Evans’ smartphone operating system market incorrectly ignores tablets

230. An especially telling example of Dr. Evans’ general approach of assuming away the many options for developers and consumers to make game transactions is his exclusion of tablets from both his smartphone operating system and iOS app distribution markets. His basis for this is a statement that tablets “provide users with different functionality than smartphones.”⁶⁶

231. There is no question that tablets can be and are used to make game transactions. One of the primary use cases for tablets is mobile gaming, consistent with the fact that Epic offered Fortnite on the iPad. Additionally, some tablets share many of the unique features Dr. Evans assigns to smartphones. Also, many tablets use the same operating system as smartphones, and have functions that are integrated with phones that use the same operating system.

232. For example, consumers can transact on both iPhones and iPads through the App Store; developers use the same tools to create apps for iPhone and iPads, as Dr. Evans notes, and developers can provide apps that are compatible with both iPhones and iPads.. Also, many apps on the App Store can be downloaded on either an iPhone or an iPad, and when consumers

⁶⁶ Evans Direct Testimony ¶ 43, footnote 3

purchase a paid-to-download app on an iPhone, they can install it on an iPad (and vice versa) without making an additional purchase. Hence pricing is directly connected for many apps.

233. Tablets are an important example of the manner in which Dr. Evans' approach simply assumes away key alternatives for game transactions. Tablets are also important because Dr. Evans' opinion that the purported smartphone operating system market is a "duopoly" of iOS and Android is based on an assumption that tablets do not serve as substitutes for transaction platforms on smartphones. Dr. Evans has offered no evidence to support this assumption. Had he included tablet operating systems in his operating system market definition his "duopoly" would disappear. iOS and Android are not the only operating systems for tablets. Other tablet operating systems include Amazon Fire OS and Windows. And, as with smartphones, there are many tablet OEMs including, among others, Amazon, Lenovo, Samsung, and Microsoft. Dr. Evans' exclusion of tablets exemplifies the unreliability of his conclusions about market definition and thus Apple's market power.

E. Epic's experts assume that differentiated game transaction platforms cannot compete and in doing so ignore the vast majority of developer and consumer choices

234. I understand Dr. Cragg (another of Epic's experts) may offer an analysis of the degree of overlap of identical games between mobile and consoles/PCs, concluding that this overlap is too small to be consistent with substitution for game transactions between these various devices and game transaction platforms. Dr. Evans also makes this point (albeit cursorily) in his testimony.⁶⁷ Such a conclusion would be unreliable.

235. This analysis would set a bar for substitution that makes no sense in the context of apps and games. Apple faces competitive constraints in its pricing for game transactions from many sources, not all of which offer every game that developers currently choose to offer on iOS. Again, competition occurs in differentiated products, and the fact that products are not identical does not imply a lack of competition.

236. The position that only identical games with identical functionality across game transaction platforms can be "substitute" game transactions between developers and consumers would be an extreme one. It would assume, for instance, that even very similar games like Call of Duty Mobile and Call of Duty Warzone (its PC/console counterpart) cannot serve as substitute game transactions because they are not exactly the same on different platforms—despite being created by the same developer and offering as similar a gameplay experience as their names would imply.

237. Such an analysis would also assume that competition for game transactions between developers and consumers across game transaction platforms cannot happen across different games. This would be economically wrong, as is evident from the fact that many consoles offer exclusive games that are unavailable on other consoles.⁶⁸ If all transaction platforms had to offer the same set of games to be substitutes, then the Nintendo Switch and PlayStation 4 would not

⁶⁷ Evans Direct Testimony, ¶ 53(iii)

⁶⁸ Matt Purslow, "Gears of War 3 Was Ported to PS3, but Was Never Going to See Release," IGN, May 20, 2020, <https://www.ign.com/articles/gears-of-war-3-ps3-port>

compete with each other for game transactions because they offer many games that are only available on one device or the other.

F. Dr. Evans ignores the ability to purchase content on one platform and use it on another, as well as the relevance of websites as a form of competitive constraint

238. The generally mistaken approach by Dr. Evans is exacerbated by his consistent conflation of the use of smartphone apps with the ability to perform game transactions (or app transactions more generally). This is because acquisition of in-game content can often occur at a different time, and on another platform, from its use.

239. Thus even if there were some games or apps that required what Dr. Evans claims are the unique features of a smartphone, to be used at special “portions of the day,” the developer could provide them and the consumer could use them in exactly that manner, but acquire that content separately. Developers are not constrained from charging their customers outside of the App Store. If a developer and consumer would prefer to transact outside of the App Store in order to avoid the relevant commission, the developer can offer this option to consumers on another transaction platform as well as on a website. Because iOS smartphones have web browsers, this means that developers can transact with a consumer any time the consumer has their iPhone, even if the app itself cannot be used or played in a web browser.

240. The fact that game and app developers choose to design subscriptions, in-app currency, single sign-on and portability that work across transaction platforms is evidence that they are both used and valued for cross-platform purchases. In general, developers can monetize a game or app such that transactions can be highly substitutable across transaction platforms, independent of whether smartphone apps are good or poor substitutes for apps on other devices.

241. Dr. Evans in fact disregards all competition from websites, even though websites are accessible on iOS devices just like the App Store. He does so by asserting, without any empirical evidence, that developers cannot create web apps accessible through the mobile browser that are good substitutes to native apps. He then, inexplicably, lists developers who have chosen to offer apps on smartphones but continue to operate successful websites on personal computers (e.g., Facebook, Match, Twitter, LinkedIn, YouTube, the Wall Street Journal, Spotify, and Hulu) as evidence of developers’ inability to offer a website version on iOS. This is getting the economics utterly backwards—in these examples developers have shown that they can both have a successful website and an app on an iOS device. Moreover, even if Dr. Evans were right, developers are free to offer the ability to acquire content through a website, separate from game play or app use.

G. Dr. Evans’ economics are confused when he states that growth is evidence of lack of substitution

242. Dr. Evans suggests that the fact that smartphones are now ubiquitous, that consumers have increased the amount of time they spend online on smartphones, and that there has been a large increase in apps written for smartphones is evidence of the lack of substitutability of other devices for app transactions between developers and consumers.⁶⁹ He claims that the growth of

⁶⁹ Evans Direct Testimony, ¶¶50–56

developers choosing to offer smartphone apps is because they cannot serve consumers on other devices.

243. The growth of developers choosing to offer smartphone apps is the hallmark of the competitive value that smartphones offer developers. To suggest, as Dr. Evans does, that this reality is instead a sign of an exertion of market power directly clashes with basic economic theory, which would expect a decline in quantity, not an increase.

H. Dr. Evans' Fortnite case study cannot support his market definition

244. Dr. Evans assesses a case study of Fortnite users' behavior after the Hotfix event that led to new versions of Fortnite no longer being available for download on the App Store and the Google Play store. He claims this study "confirm[s] key conclusions concerning foremarket and aftermarket competition in this matter," and therefore supports his market definitions.⁷⁰ Dr. Evans' Fortnite study is the only analysis of actual consumer level market data he uses to support any of his market definition calculations. (He otherwise relies on a survey by Professor Rossi, which I understand will be discussed by Professor Lafontaine.)

245. Dr. Evans' Fortnite study frames and asks a narrow question: where did iOS users who played Fortnite spend their time and money in regard to Fortnite after Fortnite updates were no longer available on the App Store? An answer to this question by definition cannot depict the degree to which users can turn to alternative game transaction platforms in the face of a non-transitory market wide price increase by the App Store or by smartphone game transaction platforms. This is because the change in circumstance of a single game—Fortnite—does not measure consumers' responses to a non-transitory market-wide change in price in the market setting relevant for this case.

246. Dr. Evans' case study cannot proxy for the degree of switching that consumers of game transactions would generally take up if Apple had increased the price for all game transactions (let alone all apps in general), in part because it does not reflect the full set of options available to developers and consumers following such a price increase. Consumers and developers would generally be able to both continue to use game apps on an iOS device but substitute payment for those game apps to another game transaction platform or shift both app use and payment to another game transaction platform and device. Consumers could also substitute game transactions to a website that users can access through their iOS browser but that would not lead to commissions for Apple. Additionally, Dr. Evans' conclusion ignores that many consumers in his case study may have simply substituted away from Fortnite to other games that remained readily available on iOS and that did not have a change in circumstance.

247. Dr. Evans has not empirically tested what would happen if the App Store, or all smartphone game transactions platforms, jointly raised their prices for all game transactions. Dr. Evans' calculation also does not allow one to understand the effect of a non-transitory price increase in game transactions because such a change does not necessitate depriving developers of a smartphone app: It only affects the prices paid for in-app purchases or downloads, while free downloads are not affected at all.

⁷⁰ Evans Direct Testimony, ¶¶ 124-134

I. Dr. Evans overestimates the degree of iOS single homers and underestimates their degree of switching game transactions

248. Based on an analysis of a sample of Fortnite user data, Dr. Evans has concluded that iOS-only users play the majority of iOS Fortnite minutes played and that following the Hotfix, iOS-only users in the U.S. switched their purchases to non-iOS platforms. While Dr. Evans' calculation overstates the degree that iOS Fortnite users single-home their purchases on iOS, he nevertheless finds that these single-homing users substituted to other transaction platforms after the Hotfix.

249. *The proportion of single homers.* According to Dr. Evans, in the U.S., iOS single-homers accounted for 65.0% of iOS Fortnite revenue during the 32 week period prior to the Hotfix event.⁷¹ In this calculation, Dr. Evans unusually categorizes as iOS single-homers those iOS users who played Fortnite on multiple platforms but chose to make all their purchases through the App Store. When I calculated the share of iOS single-homers using the appropriate definition of single-homing (one based on whether users accessed Fortnite on multiple platforms) and a dataset that includes all Fortnite user accounts (rather than a sample like Dr. Evans' data), the share of revenue from iOS single-homers is substantially lower at 38.6%. My estimate more accurately reflects the degree of revenue that is represented by single-homing Fortnite users.

250. Dr. Evans provided an additional statistic on single-homing among Fortnite iOS users that is likewise uninformative. He calculated that for players who use iOS as their "primary platform" (i.e., by his definition, those who spent most of their Fortnite playing time on iOS devices), 90.9% only ever used Fortnite on iOS.⁷² This statistic is uninformative—it is equivalent to the tautology, "when I focus on users who have a preference for playing Fortnite on their iOS devices, a significant share prefer playing the game only on their iOS device." But worse than that, the statistic is misleading: It is undisputed in the Fortnite data that iOS Fortnite users spent the vast majority of their time and money with regard to Fortnite on non-iOS devices and through game transaction platforms other than the App Store (as I show in Figure 14). Additionally, Dr. Evans has not defined a market centered around only "primary users" of iOS apps—to the contrary, he claims that all consumers of all iOS apps are locked-in to the App Store.

251. *Switching of iOS users after Fortnite Hotfix event.* Dr. Evans estimates that after the Hotfix, U.S. iOS-only app users (by his definition described above) shifted almost one-third of the total spending they would have made on iOS in the post-period to consoles and personal computers in little more than two months.⁷³ While he and I do not take the same approach when using the Fortnite data or estimating the amount of substitution to other transaction platforms after the Hotfix, it is important to understand that what he has found is that iOS-only app users who had never made a purchase outside the App Store began making purchases through other game transaction platforms on other devices. This is substitution.

⁷¹ Evans Direct Testimony, ¶ 132

⁷² Evans Direct Testimony, ¶ 126

⁷³ Evans Direct Testimony, ¶¶ 127, 132

252. Dr. Evans continues on to adjust the amount of substitution he finds for this group downward. Why? Because it is his opinion that over time some iOS-only players, like consumers in general, will naturally decide to buy game consoles and PCs on which they can, and do, make game transactions on Fortnite.⁷⁴ This shows substitution as well, as these consumers have now chosen to make payments on an alternative game transaction platform for content that can be used on the iOS Fortnite app. His attempt to account for the fact that some iOS-only Fortnite users would have moved to consoles and PCs even absent the Hotfix reduces his estimates of the share of iOS-only revenue prior to the Hotfix that switched to other platforms by almost half, to 16.3%.⁷⁵ Regardless of the reliability of his calculation, his finding implies both that substitution exists even for users who previously only played Fortnite on iOS and that there are substantial increases in iOS-only users adding payments through PCs and consoles over time *even without a Hotfix event.*

⁷⁴ Evans Direct Testimony, ¶ 132

⁷⁵ Evans Direct Testimony, ¶ 132

VI. Competitive Effects: Apple has not caused harm to competition or substantial anticompetitive effects

253. Finally, I turn to empirical analysis of the effects of Apple's conduct on competition. Epic and its experts argue that Apple's conduct has had substantial anticompetitive effects on developers and consumers. Neither Dr. Evans nor Professor Athey, however, have shown that Apple's business model harms competition relative to a hypothetical but-for world. The evidence on prices, quantity, and quality, on the other hand, shows that the digital game transaction market is thriving.

A. Dr. Evans does not offer a specific proposed but-for world; instead he focuses on case studies which in fact show that Apple's current approach leads to lower prices, greater output, and higher quality

254. Dr. Evans presents a few case studies which he claims demonstrate that developers would pay lower commissions if they had access to alternative app transaction platforms and direct distribution options in iOS.⁷⁶ (Dr. Evans also bases this opinion on a flawed thought experiment involving the entry of two rivals, which I understand Professor Lafontaine will address.) However, these case studies actually reflect how consumers and developers may be worse off in the potential but-for world.

255. One such case study on Android app distribution in China demonstrates how developers and consumers face negative consequences relative to Apple's current approach.

- Prices for game transactions are high. As Dr. Evans himself acknowledges, top game transaction platforms in China charge at least a 50% commission for game transactions.⁷⁷ Even large developers who have negotiated lower commission rates still pay a 30% commission rate for game transactions.⁷⁸
- The growth of game transactions is lower in China than in the U.S. after accounting for the growth rate in smartphone ownership in each country.
- The quality of game transactions is low. The large number of transaction platforms for Android apps in China requires developers to submit apps to each platform, which is costly, or risk losing customers who use certain platforms. As an internal Google document explains: “[A] developer is going to have a hard time keeping up with so many stores (even if they only care about the top 20).”⁷⁹
- Competition is skewed. While large developers can negotiate lower commissions or start their own app store to avoid commissions, smaller developers cannot, putting them at a disadvantage compared to larger developers.

256. Dr. Evans' case study on game transaction platforms for PCs and Macs, along with direct distribution of games for PCs and Macs, further demonstrates how developers and consumers could face negative consequences relative to Apple's current approach.

⁷⁶ Evans Direct Testimony § VI(E)(2)

⁷⁷ DX-3120.020

⁷⁸ DX-3120.020

⁷⁹ DX-3221.037

- Game developers and game transaction platforms for PCs and Macs—notably including the Epic Games Store—often enter into exclusive relationships, which limits consumer choice and reduces consumer value.
- As Dr. Evans notes, many top game developers have opened their own transaction platforms to distribute directly to consumers and have removed their games from other transaction platforms, increasing search costs for consumers who want to play these developers' games.
- Competition is skewed. While some of the largest game developers have extensively used direct distribution of games to consumers or negotiated a lower commission rate with existing platforms, small game developers usually cannot, putting them at a competitive disadvantage.
- Prices of digital game transactions are not lower. While the Epic Games Store charges 12%, it operates at a loss, is not projected to make a profit for at least the next two years, and has grown slower than the market as a whole. Steam's reduced commission rate only applies to the largest developers, and its average effective commission rate in 2019 was estimated to be 26.8%.⁸⁰

B. Professor Athey proposes the theory that forced interoperability will lead to pro-competitive benefits without conducting any cost-benefit analysis or assessing case specific information

257. Professor Athey provides a conceptual analysis of “middleware,” namely “multi-platform app stores,” and their potential role in app delivery. She imagines that if there were greater cross-platform interoperability, competition across platforms would increase, benefiting consumers and developers. Professor Athey’s theoretical argument assumes developers would no longer need to develop apps for multiple operating systems. Her argument also implies a form of forced interoperability for operating systems: under her framework all devices and operating systems (including those for Nintendo, Sony, and Microsoft consoles) would be required to be interoperable with each other.

258. She assumes that a hypothetical “multi-platform app store” would offer meaningful middleware solutions that cannot currently be offered separately and are not currently available or offered by Apple itself.

259. It is unlikely that “multi-platform app stores” would have a significant impact on developer multi-homing costs because multi-platform app stores’ provision of technical middleware in open platforms is limited. “Multi-platform app stores” may provide store-specific APIs that extend across devices. But even with these APIs, a developer must still develop a game or app and optimize it across different operating systems. Store-specific APIs do not solve that challenge.

260. Many features highlighted by Professor Athey that are provided by “multi-platform app stores,” such as chat, are not relevant to developing cross-platform games and would not reduce developer “multi-homing costs.” Others do not require a “multi-platform app store” at all. For

⁸⁰ DX-5322

example, Professor Athey argues that Steam provides “Steamworks” features which developers can use “to store game and user-level data in the cloud” and make games that are available across platforms.⁸¹ Professor Athey ignores that the implementation of Steamworks does not require a “multi-platform app store” at all, and that [REDACTED]

[REDACTED]
[REDACTED] 82

261. “Multi-platform app stores” may also introduce more costs for developers. If there are multiple transaction platforms for a given operating system (as is the case for Android apps in China), then an app developer would need to create an app for each platform on which it wants to transact. However, if each platform requires some form of customization for an app to function on it, then for a given operating system, a developer must incur additional costs to release an app on all platforms for that operating system.

262. Professor Athey’s discussion of Steam and the Epic Games Store highlights this problem. While both provide APIs that developers can use to offer games across multiple devices, they do not meaningfully increase the ability of developers to develop cross-platforms games or port games across operating systems and devices. They do, however, introduce a new problem that Professor Athey ignores: developers that wish to reach users on PC through both Steam and the Epic Games Store must utilize two sets of APIs for the same operating system. The proliferation of more transaction platforms and more APIs could generate more costs for developers, not fewer.

263. Professor Athey’s conclusion assumes that under Apple’s current approach consumer switching across platforms and developer investment in cross-platform services are prohibitively expensive. The evidence does not support her assumption: many developers already possess solutions for cross-platform portability of game progression, monetization, and play across operating systems, including iOS. A single sign-in account, used by many developers (including Epic), is a form of “economic middleware” based on Professor Athey’s definition. The means for achieving cross-device compatibility have also been increasing over time. Facebook, Google, and Apple have introduced multi-device sign-in options such as “Sign in with Facebook” that facilitate the process for developers that do not have their own sign-in systems and streamline the sign-in process for consumers.

264. Game streaming services such as Microsoft xCloud, Google Stadia, and NVIDIA GeForce Now, are another form of middleware (as Professor Athey acknowledges) that are available on iOS devices. As I discussed before, these services all provide game streaming services through the iOS web browser, and game developers have access to this type of middleware for reaching and transacting with consumers. Contrary to Dr. Athey’s criticisms, game streaming services are likely to be a strong substitute for game purchases and provide similar access to a game.

265. Technical middleware that allows developers to develop games across platforms is already supported on iOS, both by Apple’s own innovations as well as by third-parties. Apple allows technical middleware like game engines, including Epic’s Unreal Engine or the competing game engine Unity, which allow developers to develop games for multiple operating systems. Apple

⁸¹ Athey Direct Testimony, ¶ 69

⁸² ~~DX-5321~~

also offers forms of technical middleware that help developers to develop games across its own platforms. Professor Athey's theoretical "economic middleware" concern is, in short, a solved issue.

266. Finally, like Dr. Evans, Professor Athey fails to consider the many benefits that the "walled garden" nature of the iOS ecosystem and the App Store provides when arguing that "multi-platform app stores" or "economic middleware" would provide a competitor to the App Store that would reduce Apple's market power. As Apple's fact and expert witnesses will testify, Apple's business model serves to assure the safety, security, privacy and quality of the iOS ecosystem. Apple's "walled garden" ensures that all apps on the App Store have been reviewed, both by an algorithm and by a human, to guarantee apps are safe, secure, and high quality. This promotes trust in the overall iOS ecosystem, benefitting both consumers and developers. A but-for world in which other app transaction platforms existed on iOS devices, including app transaction platforms that do not insist on the same level of quality, security, safety, and privacy, would erase these benefits, harming consumers and developers.

C. Apple has not caused substantial anticompetitive effects: prices have not increased, quantity has risen, and quality has improved over time

267. No Epic expert has offered empirical evidence that the Apple policies and conduct Epic challenges has had any anticompetitive effect in the digital game transaction market—or on competition for app transactions more broadly. On the contrary, the empirical evidence shows that this market is thriving by any measure. I summarize several data points showing that the market is thriving in Figure 55.

Figure 55
Summary of App Store statistics

Entry	
New Game Transaction Platforms <i>(since launch of App Store)</i>	7 +
New Game Streaming Services <i>(through iOS Web Browser)</i>	4 +
Price	
Game App Effective Games Commission Rate <i>(FY2019)</i>	8.1%
All App Effective Commission Rate <i>(FY2019)</i>	4.7%
Game App Initial Download Commission Rate <i>(FY2019)</i>	0.2%
Quantity	
Increase in Number of Game App Transactions <i>(mid-2008 – FY2019)</i>	1,200%
Increase in Game Developer Revenue <i>(2010 – 2018)</i>	2,600%
Increase in Game Developer Revenue <i>(FY2010 Q1 – FY2011 Q1)</i>	130%
Increase in Number of All App Transactions <i>(mid-2009 – FY2019)</i>	500%
Increase in All App Developer Revenue <i>(mid-2009 – FY2019)</i>	3,700%

Source: ¶¶129, 131, 167, 170, 205, 206, Figure 33

268. First, I have seen no evidence of supracompetitive pricing. Apple's commission rate for game transactions on the App Store is competitive with other platforms offering game transactions, and Apple has lowered its commission rate to 15% for many transactions.⁸³

269. On average, the shift from paid to free-to-download apps has caused Apple's average commission rate on initial game app downloads to decrease to less than 1%. And Apple's average commission on game app in-app purchases has stayed constant. In 2019, Apple's effective commission on game transactions was 8.1%, and on all app transactions, it was 4.7%.

⁸³ Lauren Goode, "Apple's new subscription offerings are now available to App Store developers: The changes were first announced in June," *The Verge*, September 2, 2016, <https://www.theverge.com/2016/9/2/12774758/apple-developers-app-store-new-subscription-rules>

These numbers will only decrease as a result of the commission reductions for small developers introduced in the new App Store Small Business Program.

270. Second, there is no evidence of reduction in output. The total revenue of digital game transactions has risen for the market overall, and the number of transactions and developer revenues on the App Store have also increased, growing at a faster rate than the market overall. On the App Store, the amount of revenue earned by game developers has increased by 2,600% between 2010 and 2018, while developer revenues from all app transactions have increased by 3,700% between mid-2009 and FY2019. And consumers can choose from a variety of high-quality apps; even among game apps, they have a variety of options in each game genre.

271. Third, there is no evidence Apple has harmed competition by reducing quality. Apple has not reduced the quality of transactions on the App Store and has made significant investments in innovation that improve the quality of the iOS ecosystem and App Store transactions. In sum, there is no evidence that developers or consumers have suffered substantial anticompetitive effects.

VII. Oath

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Respectfully submitted,



April 23, 2021

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